Mining CONGRESS JOURNAL

SEPTEMBER 1945

EXIDE POWER

KEEPS MINE HAULAGE UNITS PULLING STRONG ALL DAY LONG

HAULAGE units that are Exide equipped take grades and curves with greater ease, handle heavier loads, and keep production moving at a faster pace. Sustained speeds are assured throughout the day. You can always count on powerful, rugged Exides for dependability, long-life and ease of maintenance.

If you wish more detailed information, or have a special battery problem, write to Exide and ask for booklet Form 1982.

ARMY E NAVY

Exide BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • Exide Batteries of Canada, Limited, Toronto

...twins born 32 years apart!

MORE WESTINGHOUSE SK MOTORS ARE USED IN COAL MINES TODAY THAN ALL OTHER MAKES COMBINED

AMPLE DESIGN—guts to carry the heavy loads—rigid one-piece frame with feet welded to frame to provide rigid integral foundation—uniform magnetic path aids commutation.

SPECIALLY DESIGNED INSULATION—field coils wound on rigid Micarta spool—vacuum-impregnated with hydrolene gum—eliminates air pockets. Mica-insulated armature coils—form-wound on all except the smaller ratings—protect against moisture or dust—prevent electrical breakdown.

EXCLUSIVE WESTINGHOUSE VESTIBULE SEAL—keeps lubricant in—dust and dirt out.

GREATER ACCESSIBILITY—brushes, brushholders and commutator readily accessible—permits easy brush adjustment or renewal—brushes readily "sanded-in".

WIDE RANGE OF RATINGS—from 1 to 200 hp to meet every mining requirement.

They may not look *exactly* alike, but the basic construction has never been changed—your SK Motor *never gets out of date,* for parts made today for the latest improved design will fit any SK Motor ever built of the same rating and frame. When you standardize on SK Motors, you automatically reduce maintenance problems and simplify replacement parts requirements—and you get performance which is unsurpassed for dependability. See your nearest Westinghouse representative, or write for Descriptive Bulletin 3500-1. Westinghouse Electric Corporation, Dept. 7-N, East Pittsburgh, Pa.

J-21303

Westinghouse

PLANTS IN 25 CITIES OFFICES EVERYWHERE

SK MINING MOTORS

Mining Congress Journal

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Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

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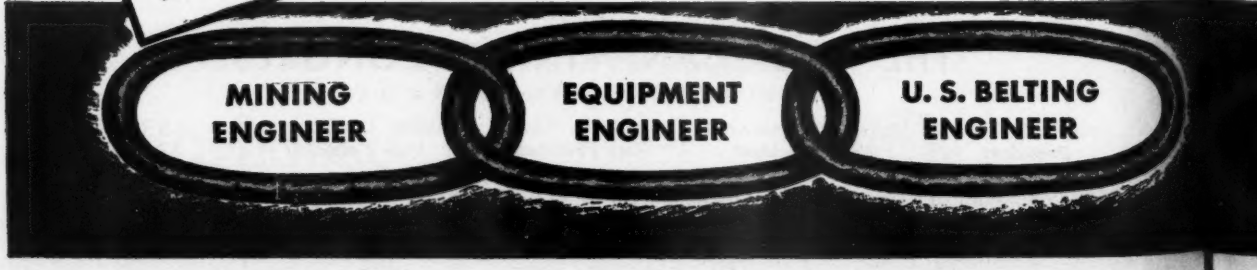
ABC

Engineering T
between the M
Equipment In
Rubber Belting
the Successful Lo
Cost Conve

The policy of 3-way engineering teamwork, which U. S. Rubber Company advocates, has been proved successful in hundreds of installations. It is the quickest, surest way to develop a conveyor system for handling coal, ore, rock, which is efficient, economical to operate and can be counted on for long, continuous service.



gTeam Work
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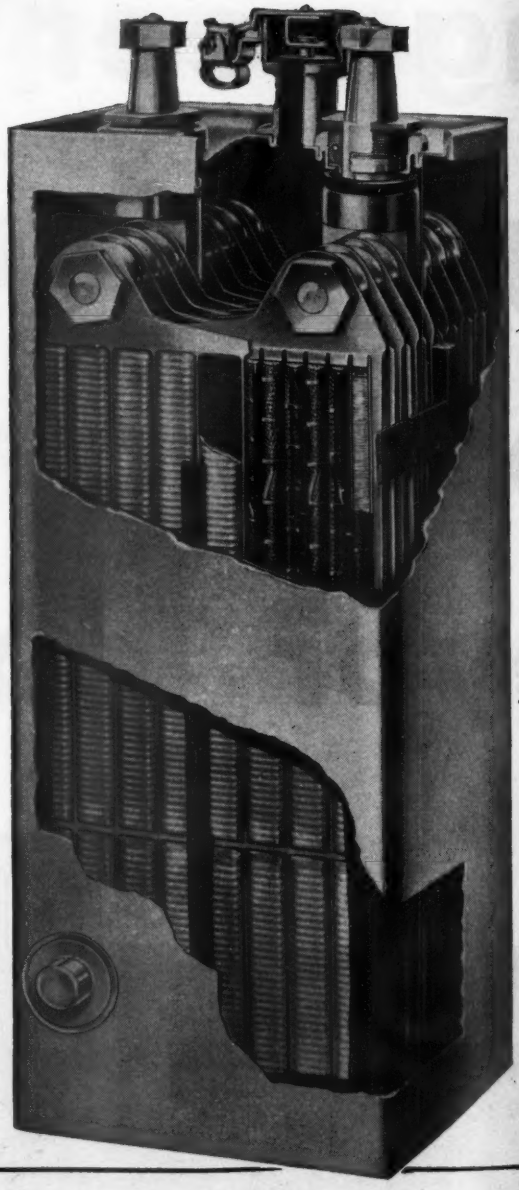
Serving Through Science



Here is a cut-a-way view of a single cell of a typical Edison Alkaline Battery for operating mine haulage equipment. Note the ruggedness and precision of its construction. The container, cover, pole pieces and other structural parts are made of STEEL. Even the active materials are permanently locked in perforated STEEL tubes and pockets. These in turn are securely assembled into STEEL grids to form the positive and negative plates. The STEEL cover is welded onto the container. In every detail, this is an entirely different cell construction than that employed in other types of storage batteries . . . and every difference is an advantage to users of alkaline batteries in locomotives and shuttle cars.

Because of their STEEL cell construction, they are by far the most rugged and durable of all batteries. When it comes to standing up under hard, rough usage in mine service, they have no equal. Alkaline batteries in mine haulage service have fallen down shafts and gone through many wrecks with little or no damage . . . and still delivered their full service life. The fact they can withstand such accidents, indicates the extra dependability that can be expected of them under more normal conditions. Their durable mechanical construction is also one of the principal reasons why alkaline batteries stay on the job and out of the repair shop, give longer life and help cut haulage costs. *Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, New Jersey.*

Edison
ALKALINE BATTERIES

KOPPERS PRE-FABRICATED PRESSURE-TREATED TIMBER

shortens construction time . . . and lengthens service life of trestles

Somewhere along the line at almost every mine, trestles are needed . . . and their cost-per-year in dollars and in time and trouble depends a lot on the material you use.

The picture shows how one large operator got low first cost, speedy construction, long life and minimum maintenance in constructing a trestle. He built of Koppers pre-framed, pressure-treated wood. Deck and railing were pressure-treated with chromated zinc chloride, the balance of the members with creosote. The structure was assembled with practically no field cutting or fitting. Pressure-creosoting gives lasting protection against decay and insect attack, and eliminates need for painting. In a number of both railroad and highway bridge installations, engineers have reported "no maintenance and no replacements" after 30 years and more of heavy traffic.

We are equipped to pre-frame bridge members to your blueprints, pressure-treat, and ship material ready for erection. We will gladly furnish details on request.

KOPPERS COMPANY, INC.—WOOD PRESERVING DIVISION
PITTSBURGH 19, PA.

KOPPERS

THE INDUSTRY THAT SERVES ALL INDUSTRY

Buy War Bonds—
and Keep Them!

One Best Permissible for Every Need

● Here is a simplified list of permissible explosives. From it you can choose the right one for every blasting requirement in coal mines.

The application of the proper permissible has enabled many operators to increase their tonnage and at the same time to get better breakage.

Hercules has long been a leader in developing improved permissibles, through exhaustive laboratory research and continuous study of field conditions, and will be glad to assist in selecting the right permissible for your requirements.

HERCULES PERMISSIBLES

TYPE OF WORK	Approximate No. of 1¼" x 8" Cartridges per 100 lbs.
For Lump Coal	
Red H* C	276
Red H* D	316
Red H* F	356
For Rock or Fine Coal	
Red H* B	280
Collier* C	320
For Wet Work	
Hercogel* A	200
Hercogel* 2	240

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HERCULES POWDER COMPANY
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934 KING STREET
WILMINGTON 99, DELAWARE

XP-52

*Reg. U. S. Pat. Off. by Hercules Powder Company

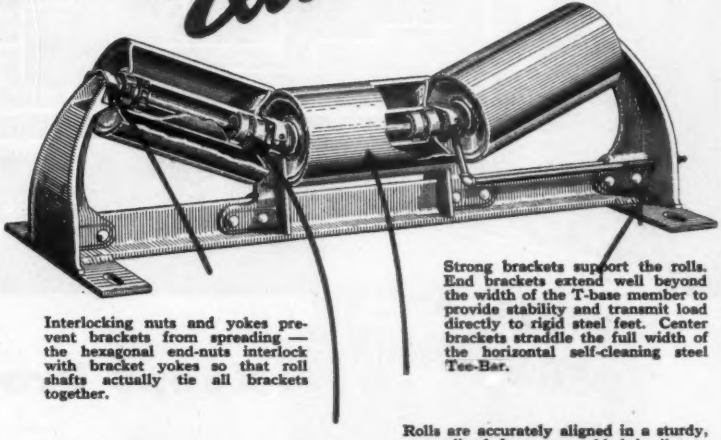
IT'S THE ENGINEERING OF EACH PART THAT GIVES YOU THAT

"Extra" in Service

● Top performance in belt conveyors depends, in great measure, on the structure on which the load moves. LINK-BELT Roller Bearing Belt Conveyor Idlers are the outgrowth of almost 50 years of constant development. Engineering that progressed to keep ahead of growing service needs has achieved outstanding design in today's LINK-BELT IDLERS.

You can depend on them, and there is every reason why, to require minimum power and maintenance — to perform smoothly and dependably and to add to the ordinary life of belts.

●



Interlocking nuts and yokes prevent brackets from spreading — the hexagonal end-nuts interlock with bracket yokes so that roll shafts actually tie all brackets together.

Strong brackets support the rolls. End brackets extend well beyond the width of the T-base member to provide stability and transmit load directly to rigid steel feet. Center brackets straddle the full width of the horizontal self-cleaning steel Tee-Bar.

POSITIVE GREASE SEAL keeps grease in and dirt out—conserves lubrication — prolongs bearing life. No springs, no loose parts, no sliding metal-to-metal contact.

Rolls are accurately aligned in a sturdy, streamlined frame assembled in jigs to assure correct bracket spacing and roll interchangeability.

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Toronto 8, Pittsburgh 19, Cleveland 13, Detroit 4, New York 7

Book No. 1915 gives full particulars

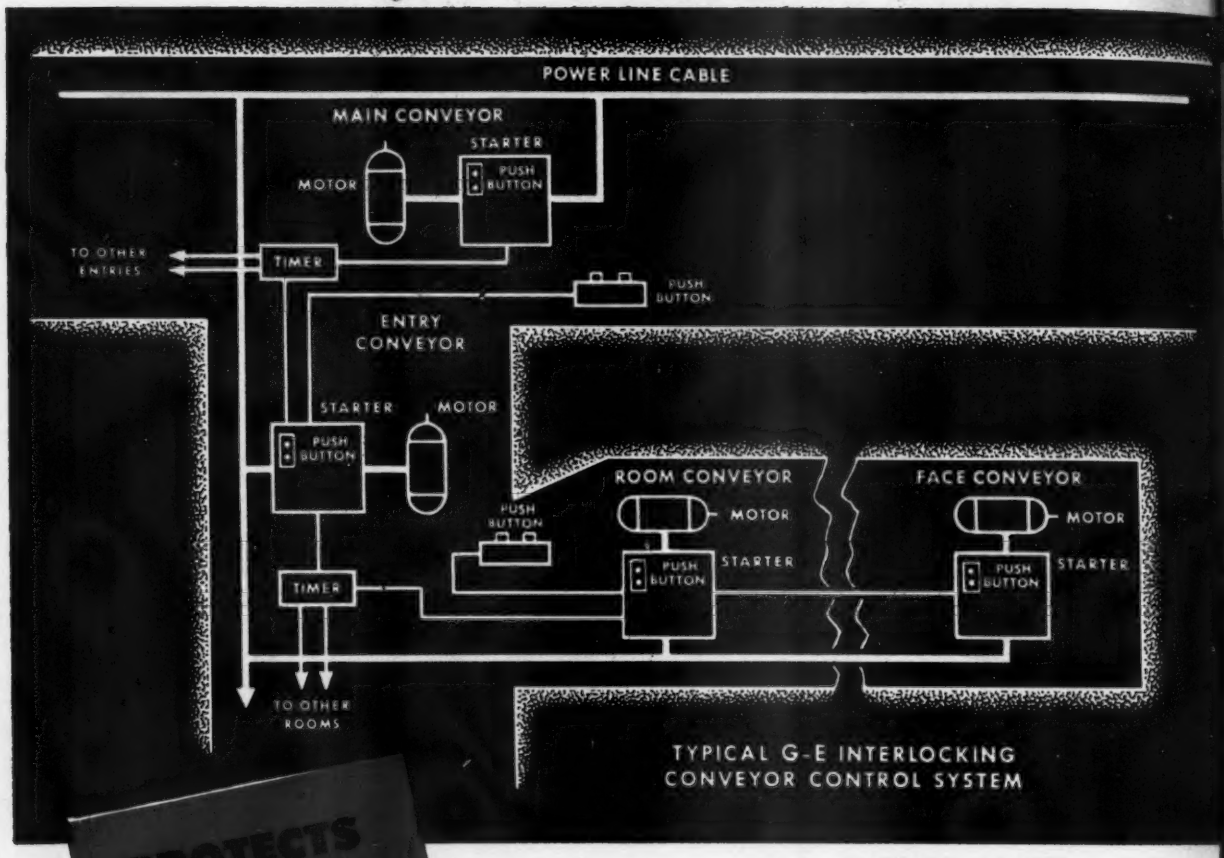
This 16-page book is packed with detailed information on LINK-BELT Belt Conveyor Idlers and the various types available in the "100" series. Drawings are shown with tables giving list prices, dimensions in inches, and weights in pounds. Write today for this book.

LINK-BELT

BELT CONVEYOR EQUIPMENT

IDLERS • TRIPPERS • BELTS • PULLEYS • BEARINGS • DRIVES

MORE SAFETY for *Conveyor Operation*



TYPICAL G-E INTERLOCKING CONVEYOR CONTROL SYSTEM

PROTECTS PERSONNEL . . . Keeps Production Moving!

This schematic diagram shows a typical coordinated system of interlocking conveyor controls that will reduce confusion, accident hazards, and lost time. The motors are connected in sequence, so that if any one conveyor breaks down, all contributing conveyors are automatically shut down, thereby preventing coal pile-ups. All motors are started by momentary contact push buttons. Once a conveyor has stopped, unexpected restarts are impossible until that particular conveyor's START button is pushed. Push-button stations can be either in the controller, at remote-control stations, or a combination of both, whichever is best adapted to efficient operation.

A prime cause of large voltage dips and momentary overloading of the power system has been the tendency of all motors in an interlocking system to start at the same time. In the G-E systems, sequence interlocking or timers so regulate motor-starting that the motors always restart one at a time.

New G-E interlocking conveyor controls for gassy mines

prevent { COAL PILE-UPS | UNEXPECTED RESTARTS | EXCESSIVE STARTING LOADS

NOW you can have safe, positive conveyor control that's co-ordinated "right down the line," from main conveyor to working face. And you can have it in gassy mines where permissible equipment is required.

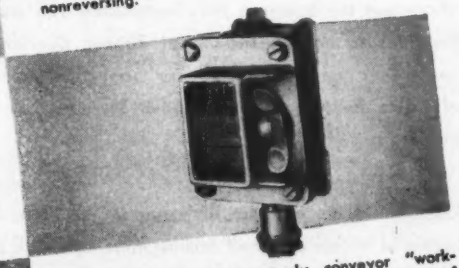
The diagram opposite shows a typical arrangement of G.E.'s new control equipment for gassy mines in a conveyor control system that is fully co-ordinated and truly automatic. With a system like this you can eliminate the hazards of dangerous coal pile-ups and unexpected motor restarts. You can avoid the excessive current peaks which occur when too many conveyor motors start at once.

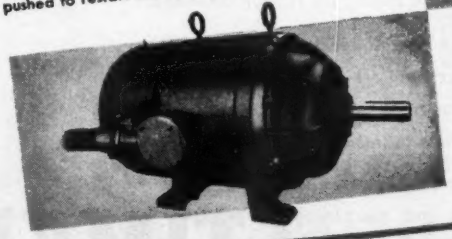
G-E engineers have had wide experience in putting conveying systems on a safe, efficient basis. Rather than supply you with equipment only, their objective is to recommend a complete plan which insures full protection against common conveyor hazards. If you feel that your conveying system needs tighter control, why not talk it over with a G-E sales engineer soon? *General Electric Company, Schenectady 5, N. Y.*

EQUIPMENT FOR BM-INSPECTED MINES

Explosion-proof Starters—Recommended for gassy mines where permissible equipment is required. This starter is built to meet all the requirements of BM Schedule 2E. Available for a-c full-voltage, d-c reduced-voltage, or d-c full-voltage starting. All have a START-STOP push-button station in the enclosure cover, and can be reversing or nonreversing.

Push-button Stations—The G-E START-STOP, momentary-contact push button, either in the cover of the starter or remotely mounted, is made according to the requirements of BM Schedule 2E and provides undervoltage protection. Unexpected motor restarts which might cause injuries to operators are avoided because the START button must be pushed to restart the conveyor motor.

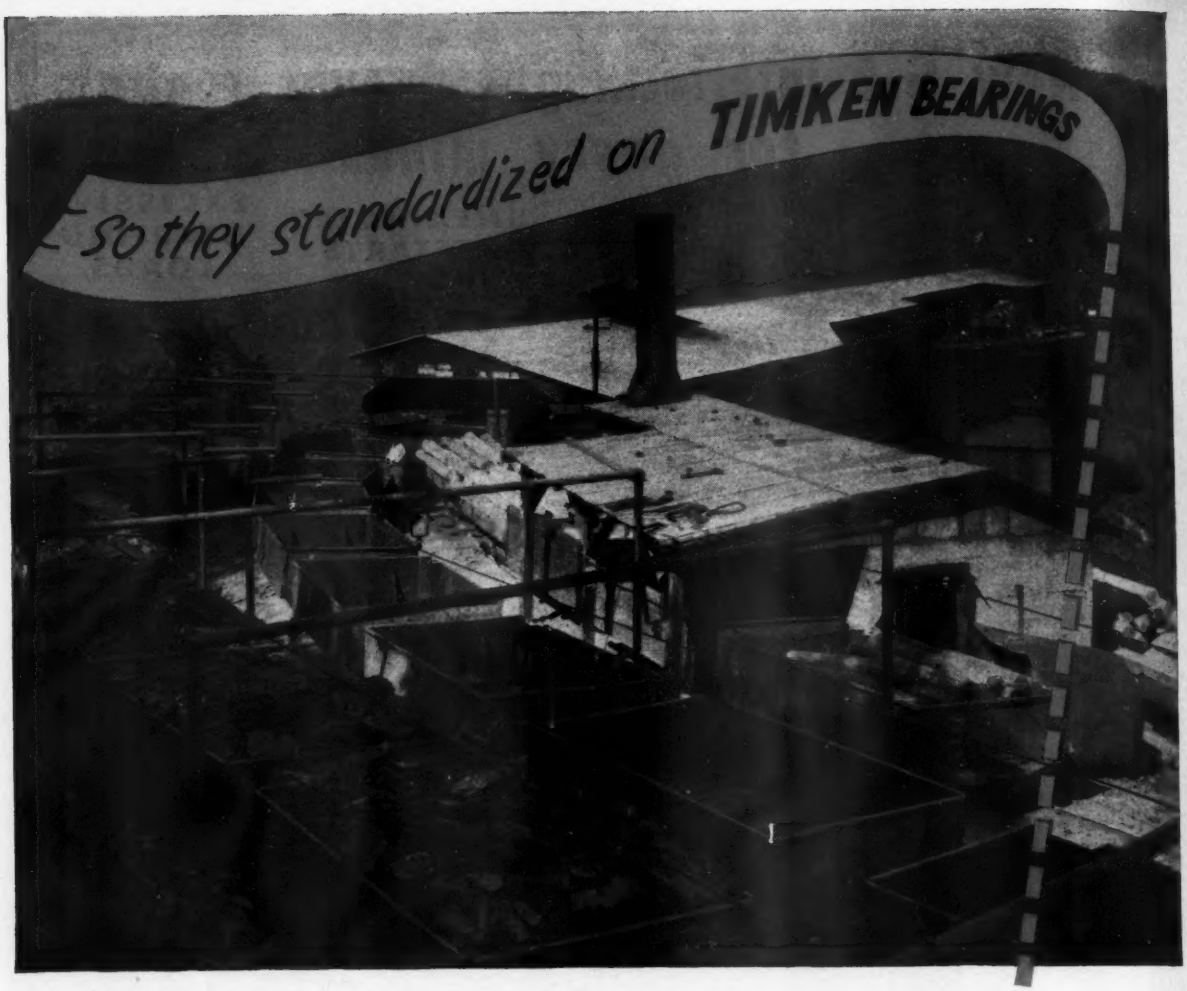




"BM" Motors—These sturdy conveyor "workhorses" meet all the design requirements of Bureau of Mines Schedule 2E. Their totally enclosed, fan-cooled construction effectively seals out dirt, dust, and dripping water, assuring long life and little maintenance. Available in all popular sizes and types to meet your mine requirements.

Buy all the BONDS you can—*and keep all you buy*

GENERAL ELECTRIC



Mine car troubles stopped years ago when Milburn By-Products Coal Co., Milburn, W. Va. threw out the bearings they were using and standardized on Timken Bearings! Today they are so enthusiastic about Timken Bearing performance they refuse to accept any other make and they are operating more than 400 "Timken Bearing Equipped" cars built by the Kanawha Manufacturing Co., Charleston, W. Va. with gratifying results.

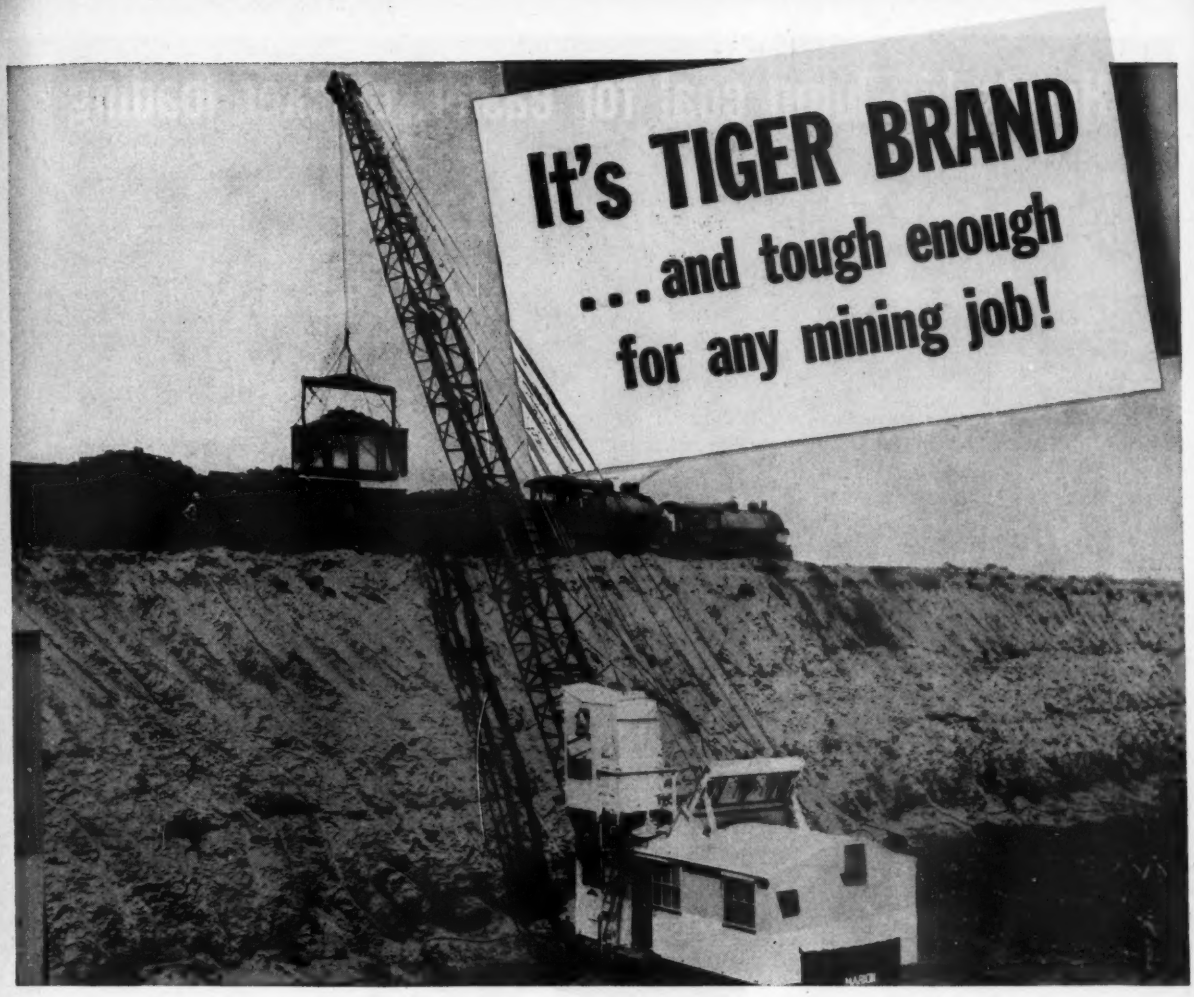
But this is not an unusual case history... It is typical of the experience of more than 1,000 mine operators who demanded "All there is in bearings" and collectively operate in excess of a half million mine cars—all rolling on Timken Bearings.

All of them found it pays to put their rolling stock on Timken Bearings because they enjoy anti-friction advantages in full, including maximum train operating speeds to and from the tipple, heavier loads hauled without increased power, simplified and economical lubrication and more cars in service with less in the repair shop.

You get all these advantages which result in lowered operating expense and increased profits if your mine cars and machinery roll on Timken Bearings. The trade-mark "TIMKEN" on every bearing you use is your assurance of enduring service and lasting satisfaction.

TIMKEN
TRADE-MARK REG. U.S. PAT. OFF.
TAPERED ROLLER BEARINGS

THE TIMKEN ROLLER BEARING COMPANY, CANTON 6, OHIO



Excellay Preformed

THE CONFIDENCE miners and operators have in TIGER BRAND Excellay Preformed Wire Rope is well placed. Actual on-the-job comparisons have proved repeatedly that this superior cable is tougher, yet easier and safer to handle than non-preformed wire rope.

U·S·S American TIGER BRAND Excellay Preformed Wire Rope is more flexible. It doesn't kink easily. Spools evenly. Crown wires lie flat and in place when broken. They do not stick out to cut hands or tear clothes of handlers.

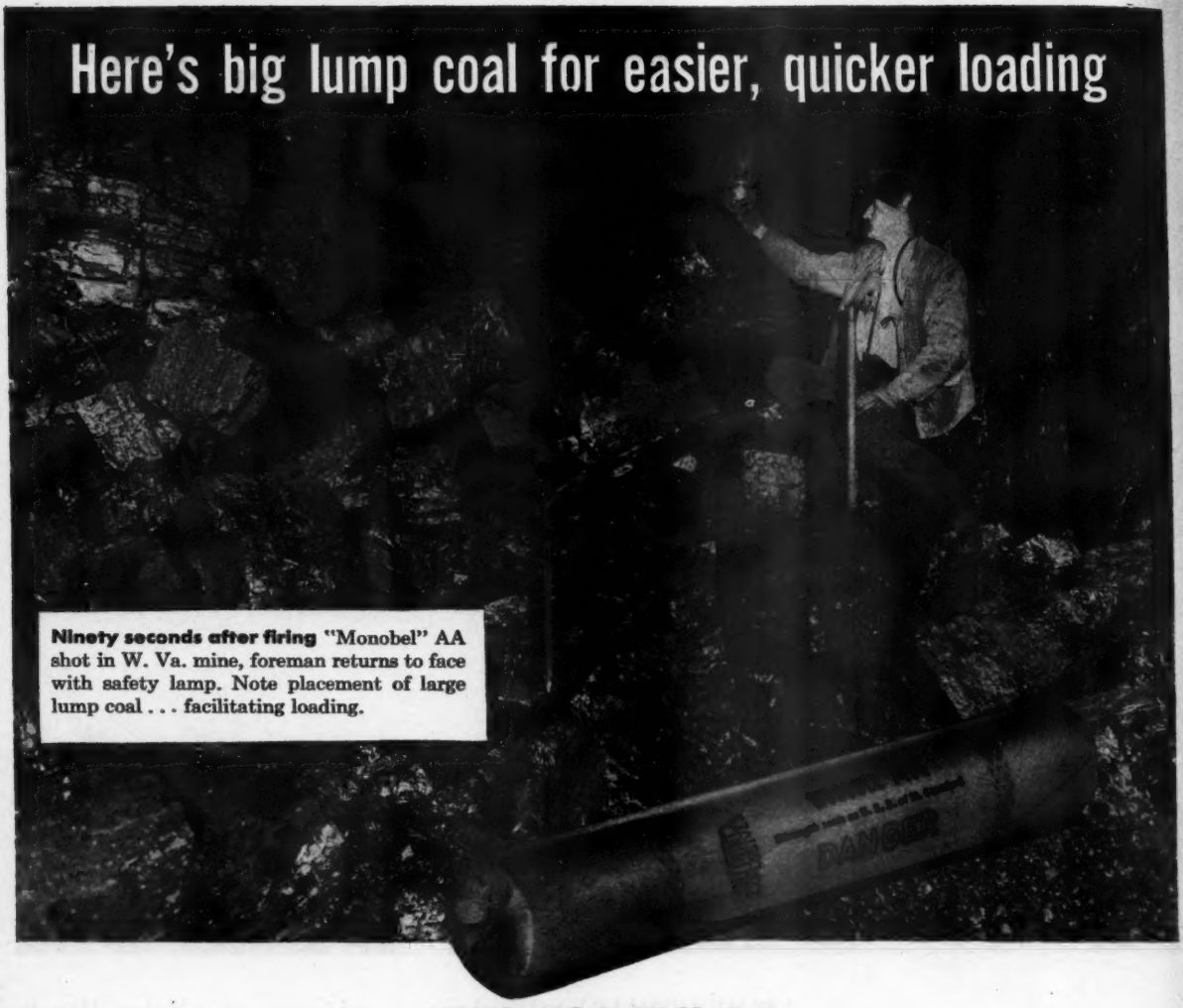
All of these, plus TIGER BRAND's great stamina, mean less time lost because of repairs, replacements and accidents. In other words, speedier, more profitable mining.

Whatever your material handling, hauling or hoisting job, you'll find an American TIGER BRAND Wire Rope built for the purpose.

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York
COLUMBIA STEEL COMPANY
San Francisco
United States Steel Export Company, New York
UNITED STATES STEEL

U·S·S AMERICAN
TIGER BRAND *Wire Rope*

Here's big lump coal for easier, quicker loading



Ninety seconds after firing "Monobel" AA shot in W. Va. mine, foreman returns to face with safety lamp. Note placement of large lump coal . . . facilitating loading.

"MONOBEL" AA

helps get more coal out faster...in wet or dry places

Large lump coal like that in the picture above is typical of what you get with "Monobel" AA . . . a new permissible.

Du Pont research developed and perfected "Monobel" AA. It is ideal for hard-shooting coal whether the work is wet or dry, because it provides a combination of coal-getting ability and water resistance.

"Monobel" AA is unique. It piles the coal near the face where mechanical loaders can readily get at it. It doesn't shatter the coal. Face and ribs are sheared clean and square. Frequently, fewer holes are needed.

Field reports from many mines show that "Monobel" AA is a powder that meets every condition encountered. It can handle average rock and slate; and in some cases, it is fired after being under water during the entire shift. Fumes are Class A . . . permitting the loading crew to return to the working place with minimum delay.

Introduced little more than a year ago, "Monobel" AA has enjoyed a steady increase in sales. Today, it is a "best selling" permissible.

E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

DU PONT

PERMISSIBLES

BLASTING SUPPLIES AND ACCESSORIES

DU PONT

REG. U. S. PAT. OFF.

KATHANODE
Glassklad since 1925

GOULD

PIONEER OF GLASSKLAD CONSTRUCTION

First American battery to use glass protection, Kathanode has had twenty years of unqualified success in powering mine locomotives. Behind it are two decades of constructive research—research that has developed:

Kathanode grid, exposing a minimum of surface area yet with ample cross-section for electrical conductivity.

Black Oxide, the unique active material with the regenerative pure lead core.

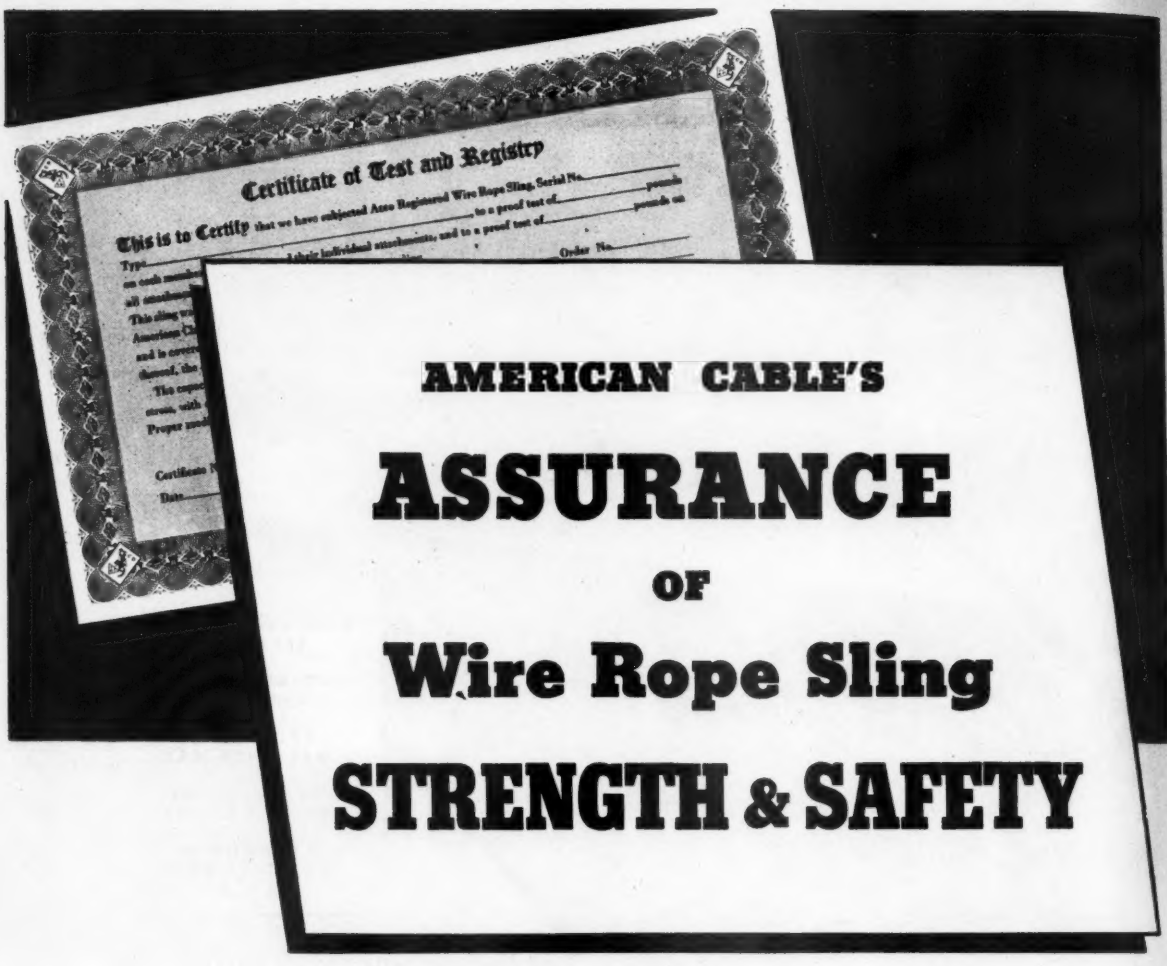
Spun glass mat, of exclusive layered design that positively retains useful active material.

Unit-Seal envelop, with open ends and solid edges to prevent treeing of spent material.

Durapor separator, of deeply ribbed and highly porous rubber construction, with high mechanical strength.

This research is constant; so look to Gould for leadership in storage battery developments. To the advantages of electric mine locomotives, add Kathanode, the best battery power for propulsion. Write Dept. 129 for Catalog 200 on Kathanode Glassklad Batteries for Mine Locomotive Service.

GOULD STORAGE BATTERY CORPORATION


Certificate of Test and Registry
This is to Certify that we have subjected Acco Registered Wire Rope Sling, Serial No.
to a proof test of pounds
and to a proof test of pounds on
their individual attachments; and to a proof test of
Order No.

AMERICAN CABLE'S

ASSURANCE

OF

Wire Rope Sling

STRENGTH & SAFETY

• Now you may have registered assurance—a Certificate of Test and Registry—with your wire rope sling.

American Cable proof-tests every Registered Sling to twice its rated capacity. Then, as proof of known strength and safety, you may have your sling **ACCO-Registered** and receive a Certificate showing the actual proof-test load, maximum safe load and date of testing. Only the highest grade wire rope (TRU•LAY Preformed of Improved Plow Steel) is used to make American Cable's **ACCO-Registered Slings.**

ACCO-Registered Service helps you select the right sling for your particular job; then registers and identifies its pre-determined strength. Send today for your free copy of the book on **ACCO-Registered Sling** Service.

ACCO

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma, Bridgeport, Conn.

AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

In Business for Your Safety

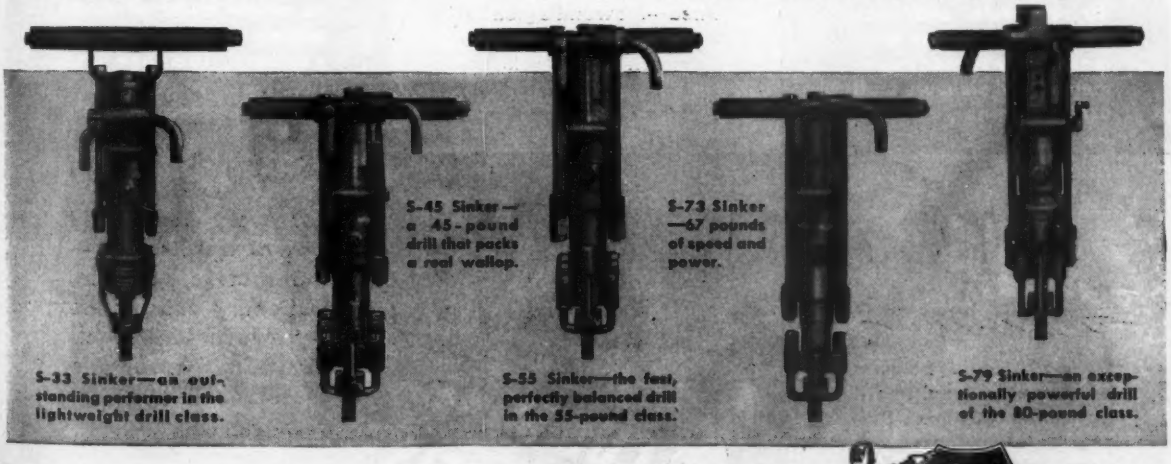
A POWERFUL BLOW . . .

. . . . . plus Powerful Blowing

• Amazing hole-cleaning ability . . . fast, powerful blows . . . these are two of the features that make Gardner-Denver Sinking Drills a top choice among mining men. Add to them a perfect balance that assures easy riding and cuts drill runner fatigue and you can see why this drill is so popular with drill runners and operators alike.

Gardner-Denver sinkers help speed drilling even in the hardest rock formations . . . permit faster footage per shift. Their exceptional hole-cleaning ability keeps the hole free of all cuttings . . . eliminates stalling . . . assures positive maintenance of drilling speed. Powerful, four-pawl rotation, low air consumption, and minimum maintenance costs are other "extras" that help Gardner-Denver sinkers stay ahead of the field.

For complete information, write for illustrated bulletins. Gardner-Denver Company, Quincy, Illinois.



S-33 Sinker—an outstanding performer in the lightweight drill class.

S-45 Sinker—a 45-pound drill that packs a real wallop.

S-55 Sinker—the fast, perfectly balanced drill in the 55-pound class.

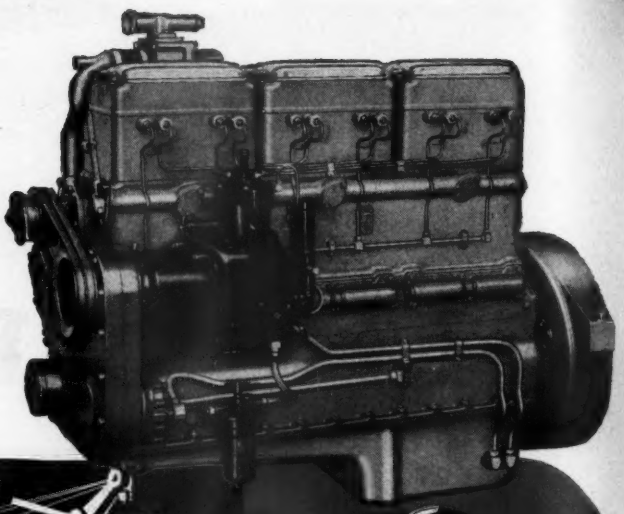
S-73 Sinker—67 pounds of speed and power.

S-79 Sinker—an exceptionally powerful drill of the 80-pound class.

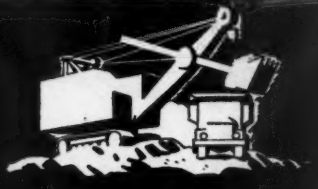
Since 1859

GARDNER-DENVER

Jobs for PROVED POWER are jobs for CUMMINS DIESELS

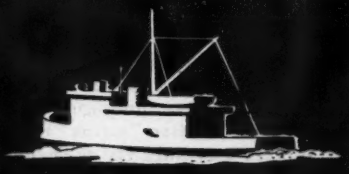


More than 90% of all the long-line, franchise-operated, heavy-duty, diesel-driven trucks now operating in the 11 Western States are Cummins-powered.



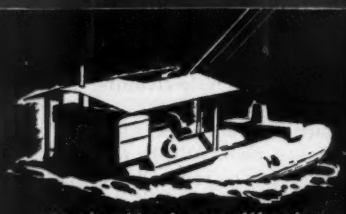
Any list of the nation's major contractors is a list of Cummins Diesel owners. Their records prove that . . . "powered by Cummins is powered for profit."

On the rich Mesabi Iron Range, more than 80% of the rubber-tired earth and ore moving equipment is powered by Cummins Dependable Diesels.



Service facilities at some 40 salt water and fresh water ports . . . one more reason why so many commercial and pleasure craft are Cummins-powered.

In the vast Mid-Continent Area—the world's greatest oil producing region—Cummins Dependable Diesels power more drilling rigs than any other diesel.



In the Northwest Woods, no single make of diesel engine powers as many yarders, loaders and heavy-duty trucks as Cummins Dependable Diesels.

Some 130 leading builders of powered equipment now offer Cummins Diesels as standard or optional original power . . . proof of proved performance!

For every heavy-duty power application—automotive, portable, stationary and marine—a proved-on-the-job Cummins Dependable Diesel . . . 50 to 275 hp.

CUMMINS ENGINE CO., INC.
Columbus, Indiana

CUMMINS DIESELS

SINCE 1919...PIONEER OF PROFITABLE POWER THROUGH HIGH SPEED DIESELS

PUT A CLEVELAND IN THAT *Stope!*

CLEVELAND Stopers are truly the drill runner's friend because they pack plenty of power, yet are well balanced and easy to handle. For example, *trip rotation* enables rotation to be started or stopped at will. This helps collar the hole and prevents "spinning" and accidents. Then the handy *air feed relief* provides control of feed pressure when passing through variable ground. Another outstanding feature is the *end seating valve*—it actually improves with use, and helps insure low air consumption.

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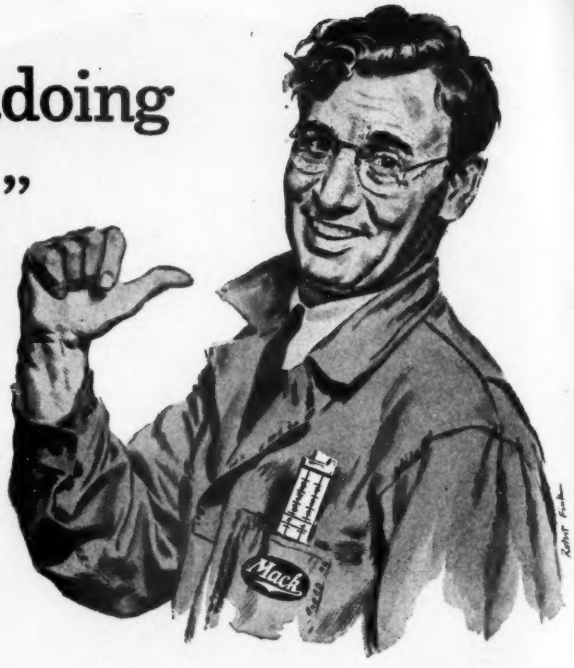

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Mining CONGRESS JOURNAL

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S. A. TRENGOVE, Editor

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On "Full Employment"

NOTABLE objections to the Murray "full employment" bill center around its likely ineffectiveness in preventing depressions, the economic dangers inherent in its plan of operation and the prior need for other basic legislation.

Administration forces stand solidly behind the proposal—seeming to feel that whatever its shortcomings its definition of Government responsibility in guaranteeing "jobs for all" is necessary at this time. Endorsing the unparalleled capabilities of free enterprise they nevertheless lay the blame for past depressions solely at its door. Improvement, they assure us, lies not only in encouraging the maintenance of full private employment but also in preventing job scarcities through Government expenditures. To implement this, the President would make use of a continuous study of our national economy so as to get advance warning of impending unemployment—and recommend Congressional action.

Labor, with an eye to steadily decreasing hours and more pay wants the bill. But industrial and financial leaders do not accept its premises so freely. Beardsley Ruml says "the bill attempts to do too much," creating the danger of a "gigantic and unworkable load" and "vast improvised expenditures, unwholesome centralization of power, and ultimately the dependence of a substantial segment of the working population on Federal largess for its employment." Certainly experience with prewar Government spending and work programs justifies this view.

Likewise, no matter what his source of information, the President might find great difficulty or even embarrassment in forecasting employment trends. His announcement of downward tendencies might well be tantamount to depression by Governmental proclamation.

Unemployment is not mere happenstance; it is the result rather of definite economic errors committed by some member of our economy, such as, business, Government, agriculture, labor, et cetera. To industry leaders the bill is much less important than the elimination of economic blind spots: Mismanagement of the money and credit system; Granting or perpetuating special privileges; Prevention of adequate capital flow into productive job-making activities.

The greatest caution is recommended against haste in handling job legislation. Indeed, its urgency seems to fade in the light of a recent WPB survey which indicates that key industries anticipate that the end of the year will find production exceeding that of prewar days in value and industrial employment will then be 96 percent of prewar levels.

Proponents of Government pump-priming may therefore have but little time to beat the drum of prolonged unemployment. The shorter this period the better, lest we find ourselves launched on some Super New Deal based on a Federal spending philosophy—which has yet to prove its ability to end a depression.

Coal Requirements Still High

MISINTERPRETATION of the recent press report that Army cut-backs would release 145,000,000 tons of coal led immediately to the annoying and widespread belief that all kinds of coal will now be plentiful. Unfortunately this statement gained broad and rapid acclaim — much more so we fear than Dr. Potter's realistic rejoinder, "the end of the fighting will mean little or no improvement" in the coal situation.

Careful checking of changed requirements by the Solid Fuel Requirements Committee reveals that production must continue at present high levels to meet newly estimated consumption of 570-585 million tons of bituminous coal in the year ending March 31, 1946.

Railroads, coke ovens and miscellaneous manufactures will take less coal while retail and direct truck deliveries, cement mills and exports will take more. Little change is expected in electric power utilities, rolling mills, coal gas retorts, colliery fuel, lake vessels and tidewater bunker fuel. The effect of the end of the war is surprisingly small, a total reduction of but 15,000,000 tons being seen from the previous estimate of 600 million. At this writing the picture has not yet changed sufficiently to bring about removal of the "80 percent" quotas previously placed on users.

Kind of coal is important. Many users are unaware of the differences in industrial and home use coal. One early effect of the Army's announcement, for example, was refusal to purchase certain grades of coal currently available, in the hope that preferred grades will soon be in ample supply.

The West and Midwest areas are in a better position than the East, where consumption is high and production, particularly in the higher grades, has not yet caught up.

Manpower shortages are still serious and relief from discharge of soldier miners is likely to come too late to do much good. The Army has been of little help in meeting the situation, and its misleading statements on the supply prospects served only to increase the industry's difficulties in keeping the wheels of distribution turning efficiently.

25 Years Progress in Coal Mining

A Review of Events During the Past Quarter Century Indicates a Steady Advance in Mining Techniques Attributable Largely to Improvements in Mechanical Equipment Available

★ ★ ★ ★ ★

The Anthracite Field

By CADWALLADER EVANS, Jr.
Vice President and General Manager
The Hudson Coal Co.

THERE has been progress in many branches of anthracite mining in the last 25 years, the most spectacular being the tremendous increase in stripping. Of equal or even greater long time importance has been the substitution of mechanical equipment for human labor in loading coal underground.

In the anthracite region, the term "Machine Mining" refers generally to any sort of mechanical operation which has to do with the loading of coal, and is, therefore, not limited to operations connected with undercutting, as the term frequently is in the bituminous region. In the anthracite region we call coal "Machine Mined" even though it is shot off the solid, if it is subsequently loaded or handled by machinery.

Up until about 30 years ago, there was practicallly no power-driven machinery used to undercut or drill in anthracite mines. Coal was all blasted off the solid, the explosives being placed in hand-drilled holes.

Drilling Machines

The use of power drilling machines began about 1912, when the first compressed air driven drill was installed by the Philadelphia & Reading Coal & Iron Company at their Wadesville Colliery. This "Jackhammer" was a considerable improvement over the hand machines used in drilling shot holes and was a tremendous improvement over the hammer and hand drill method used in drilling hard rock. The progress of the new method of drilling was slow, however, but today practically all of the difficult drilling is done by machines, either air-driven or electric-driven. There is still, however, a considerable amount of hand drilling where the work is not hard, or where the amount of coal to be recovered does not justify the installation of air or electric lines. Electric drills were tried out for drilling rock, but were never adopted; there are hundreds in use for drilling coal.

Undercutters

Undercutters came about the same time as drilling machines, the first probably being one put into use in 1910 in the Butler mine of the Hillside Coal & Iron Company. This was a machine designed specifically for soft coal and it was soon demonstrated that such a machine could not be used in the anthracite region, but would have to be made very much stronger and have about twice as much horsepower as was necessary in soft coal.

During the succeeding 10 years, this type machine was developed by several manufacturers but it has never been widely used, despite the fact that it gives some increase in percentage of prepared sizes. The reason for the slow progress is the fact that the service is very hard, the upkeep on the machines is necessarily high, and the further fact that in any case most anthracite must be crushed after being brought to the surface and before being prepared for market, and so in many cases there is large question about the actual dollars and cents value of the larger lumps which the machine makes. Furthermore, the machines cannot be used economically in steeply pitching seams, nor in very thin seams. We have used them to advantage on retreating longwall faces, and in chambers where the vein is 5 ft. or more in height, and we have also used them in places where the protection of tender roof was necessary, the undercutter making it possible to blast the coal with less shattering of the roof rock.

Scraper

The first system of mechanical loading used in the anthracite region to any great extent was the scraper, and the first scraper that we know about was built by the Lehigh Valley Coal Company in 1914. The Hudson Coal Company quickly adopted the device and greatly extended its use, which has been continuous for the past 30 years. During the year 1944, 33 percent of our inside production, or about 1,482,751 tons, was loaded by scrapers.

The scraper has the great advantage of entirely eliminating the necessity of rock work in chambers and in companion air-ways, thus very considerably reducing the cost, and its introduction and subsequent continued use has made available for the

market many millions of tons of anthracite that otherwise could not have been profitably mined.

It is easily used in 26- to 30-in veins, and some veins as thin as 22 in. have been successfully and profitably mined. The essential element is the "V" shaped scoop made of steel, shown in Fig. 1. It is made in several sizes, the medium size being 4 ft. wide at the open end, 4 ft. long, 17 in. high, and has a capacity of about 1,000 lb.

The scoop (Fig. 1) is drawn back and forth between the working face and the car on the gangway by means of cables actuated by a double drum hoist, and it is manipulated around the face of the gangway by various arrangements of movable snatch blocks—open and closed.

Generally more than one chamber is worked by a gang of men, sometimes as many as five, so that fairly continuous output can be maintained throughout the whole of the shift. The production varies from 5 to 25 cars per shift, depending upon the thickness of the bed and the amount of refuse to be handled.

The principal mechanical element is a double drum hoist, as shown in Fig. 2. Each drum is controlled by separate friction. Hoists of various sizes are used, 7½ h.p. the smallest, 10 h.p. the next largest, and 15 h.p. the largest, except for very difficult conditions, which are rare.

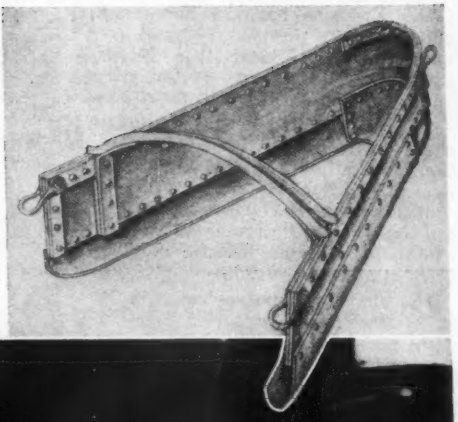


Fig. 1. The V-shaped scoop is made in several sizes. Average capacity is 1,000 lbs.

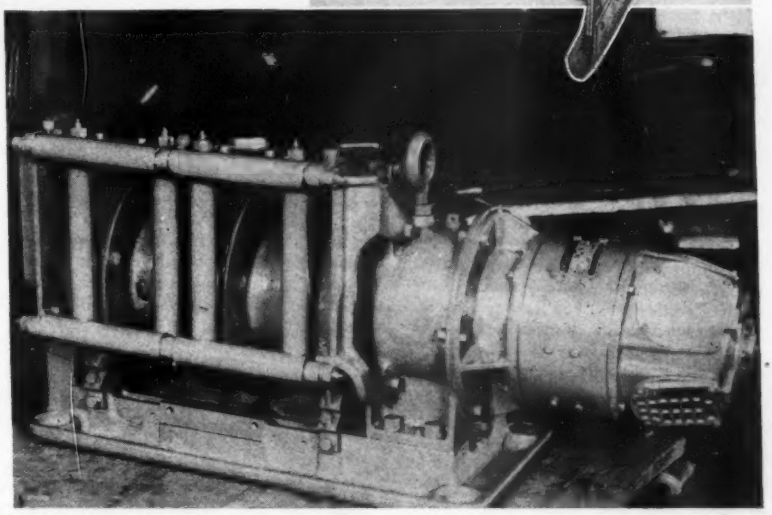


Fig. 2. Double drum electric hoists in use vary in horsepower from 7½ to 15

Flight Conveyors

Flight conveyors were used underground as early as 1912, when the D. L. & W. Coal Company (now Glen Alden Coal Company) installed in their Dodge mine the first such conveyor of which we have record. These flight conveyors were fairly heavy, quite cumbersome, and while still used to some extent, they are not very highly esteemed and their use has not grown.

Belt Conveyors

Belt conveyors have been installed in a few anthracite mines, but not to a large extent. The Penn Anthracite Company a few years ago installed a completely mechanized mine in which belt conveyors were used from the working face to the railroad car, but that is the only example of a completely equipped belt conveyor mine of which we have knowledge, although there are quite a number of endless belts in use, but not nearly to the extent that they have been installed in bituminous mines in recent years.

Shaking Conveyors

The most generally used means of underground conveying now is the shaking conveyor. It is highly esteemed because it is capable of being used in badly broken ground, requiring an opening only about 3 ft. wide and, therefore, permitting of very close timbering. The scraping conveyor which preceded it by many years requires an opening at least 6 ft. wide, and a very much wider opening at the working face and so is not useful in broken ground, consequently the shaking conveyor has been very largely adopted.

Apparently the first shaker chute was one imported from Scotland by The Hudson Coal Company in 1926, known as the Mavor-Coulson. It did not work satisfactorily because it was too heavy, and too clumsy.

The first successful shaker chute of which we have knowledge was put into the anthracite region in November, 1928, based upon experience gained by observation of the operations of the Union Pacific Coal Company.

Shaker chutes are manufactured by a number of concerns. First they were largely imported from Germany

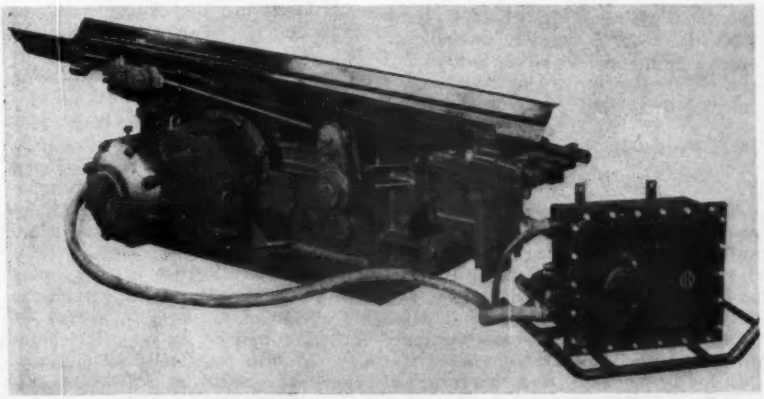


Fig. 3. The shaking conveyor is capable of use in openings only 3 ft. wide, making it especially valuable in badly broken ground requiring close timbering

—the Eickhoff—but are now made successfully in this country by several manufacturers—Vulcan Iron Works, Goodman Manufacturing Company and La-Del among others.

Fig. No. 3 shows a modern shaker chute driving unit with pan connection mounted over the drive and permanently attached to it. Shaker chutes are particularly satisfactory for use in caved ground and under bad roof conditions, because they require minimum clearances.

The chutes themselves come in 10 ft. sections and are bolted together with special bolts which can be clearly seen in the illustration in Fig. 3. In most instances the coal is loaded onto the shaker chute by hand, but since the pan is only about 6 in. above the floor, the physical labor is greatly reduced over hand shoveling into a mine car.

General experience has been that chutes should not be extended farther than 300 ft., because even though the pans are properly aligned and supported on anti-friction rollers, the pan line tends to buckle. We have successfully used shaker chutes on 400 ft. longwall faces, but only after installing two separate drives and pan lines, one line dumping into the other.

Although the introduction of shaker chutes on our property came 10 years after the scraper, we are now loading about 51 percent of our output on shakers, the increase being from about 78,000 tons in 1930, to about 2,100,000 tons in 1944.

Duckbills

The first shaker chutes installed involved manual labor in shoveling onto them, and most of them have been so loaded, but a device called the "Duckbill" developed by the Union Pacific Coal Company in Wyoming, has proven quite satisfactory in converting the shaker chute into an automatic loading unit. It was first introduced about 1927 and after considerable changes in design has proven itself to be of great value in locations where it can be adapted. With this device the reciprocating motion of the shaker chute is used to cause the material to move automatically on it, saving human labor.

Self-Propelled Mobile Loading Machines

These machines have not been as generally adopted for loading coal in anthracite mines as they have been in the bituminous region, because our physical conditions are not well suited to them. They have been and are being used, however, for the loading of rock, either in rock tunnels or in the development of rock gangways, and there are 30 or more machines in use in the anthracite region today.

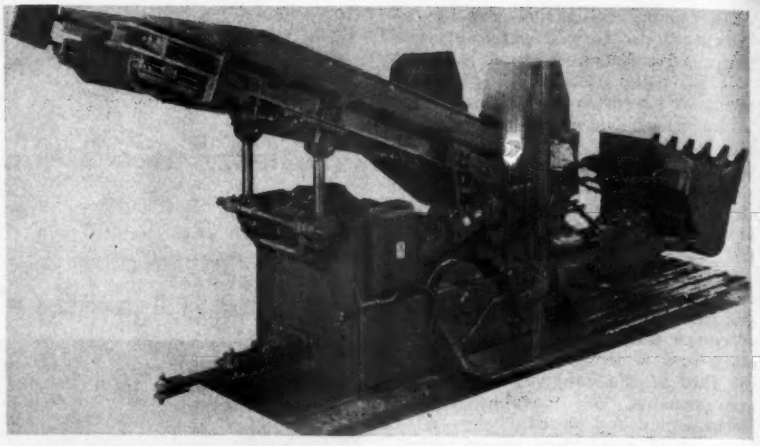


Fig. 4. This 9-cu. ft. dipper swings to either side and dumps onto a belt which discharges into a car

Fig. 4 shows a typical machine, being a Conway Mucker of the bucket type. The 9 cu. ft. dipper swings to both sides, dumps onto a belt which discharges into a car. Mucking machines of other types are in use to a small extent.

Summary

Mechanical loading is not applicable to many parts of the anthracite region due, in the southern field, to steeply pitching seams, and in the northern field, to badly broken seams. The percentage of mechanically loaded coal has, however, increased steadily during the last 20 years, and in 1944 amounted to 14,487,117 tons, or 22.6 percent of the total output. The percentage mechanically loaded by the different companies naturally varies widely. Our company in 1944 loaded 3,523,433 tons mechanically, or 84 percent of its underground production.

The Illinois Field

By W. J. JENKINS

President and General Manager
The Consolidated Coal Company

"MINING in the Illinois Field Twenty-five Years Ago" reminds me of the newspaper articles that appear in various newspapers entitled "What Happened Twenty-five Years Ago."

Taking 25 years ago from 1945 would put us back to the date 1920. Nineteen twenty would be considered in the pre-mechanization or pre-modernization period. In that year there was very little mechanization being practiced. The only mechanized methods then in use that remain today are the undercutting machine and the use of locomotives as a means of gathering coal or for main-line haulage. In 1920 practically all coal was being loaded by hand, with the application of the wage scale in use for that method of mining. The coal production necessary was the amount needed to supply industry during the post-war period.

Much Progress Since 1920

If my memory serves me correctly, and I think it does, the year 1920 showed much of the coal as being shot by non-permissible explosives after having been undercut. Much of the gathering was done by mules, and at that time the use of the battery locomotive for gathering, or reel locomotives for gathering, was just getting under swing in many mines. Practically all tonnage in the State of Illinois was procured from deep-shaft operations.

The year was also just the beginning of strip operations and then only 367,000 tons (of an illy prepared prod-

uct) out of 72,000,000 tons came from the open pits. Compare this to the 1944 figure, wherein strip operations produced 17,000,000 tons of excellently prepared coal out of approximately 74,000,000 tons of bituminous coal produced in the State of Illinois.

This same period saw the mechanically mined coal in deep-shaft operations go from zero to over 90 percent of production. These figures lead one to inquire as to just what causes made necessary the use of mechanical methods which occasioned large expenditures for capital items in coal production. This reflection brings up the year of 1922, at which time the Jacksonville agreement became effective in this State. This agreement was only partly effective in the mines south of the Ohio River, many of them operated on an open-shop basis with such a wage scale as the operators were able to secure.

Results of Jacksonville and Other Agreements

The lack of a competitive wage scale in the central field in the 10-year period subsequent to 1922 caused Illinois production to drop to a low of 34,000,000 tons in the year of 1932. This lost production went to other fields which did not have to pay the high wage scale provided for in the Jacksonville and subsequent Illinois agreements. The fact that the miners of other States worked for a fraction of the Illinois wage scale made it possible for such producers to lower their prices to a point where they could divert the tonnage from the Illinois mines and retain the tonnage so secured.

These conditions resulted in many of the operating mines in the State going out of existence and caused many of the miners to go elsewhere looking for work. Those that did remain worked a very meager number of days during the year. This condition was recognized jointly by the Illinois coal operators and District No. 12 of the United Mine Workers of America, and in the year 1928 a wage scale was negotiated—mutually approved—which provided for mechanical or modernized operation. It was the year 1928 that really saw the mines in Illinois start on a mechanization program which continued from year to year, until at the present time practically all the deep-shaft tonnage in the State is mechanically mined and loaded by modern methods. Our own company started the mechanization program in 1928 and continued it up to the immediate moment with all of the company's properties operating on a modern mechanical basis.

Mechanical Loading Brings About Many Changes

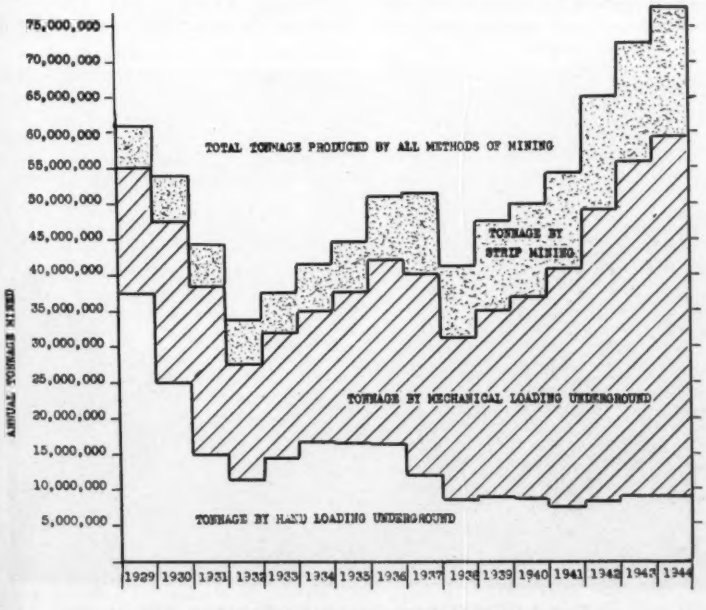
The utilization of mechanical means of loading coal brought out some operating defects which include such items as changes in face preparations, changes in method of shooting, changes in undercutting, and, most of all, necessary changes at the top, where the mines were not equipped with mechanical cleaning plants. At such mines it became necessary to rebuild the tipples and screening plants and equip them with picking tables in order that the impurities within the coal seam, which were loaded into the pit car by the loading machines, could be removed and a salable product loaded into the railroad car. The making of these changes made it possible to proceed with the mechanization program to a point where mechanically loaded coal is just as desirable as the former hand-loaded product and at a cost that permitted the modernized mines to continue in operation.

Some Effects of the Mechanization Program

The following table shows a comparison in the number of mines, men employed, and tons produced in the years 1920 and 1944. These figures cover only the shipping mines, which produce over 95 percent of the State's output and do not include the so-called "local mines," which in 1944 produced approximately 3½ million tons. The effect of mechanization is clearly shown by these figures. In 1944 less than half the number of mines and about one-third of the number of men increased the output 1½ million tons over that of 1920.

Year	No. of shipping mines	Men employed	Tons produced
1920....	373	85,000	72,409,000
1944....	157	29,000	73,958,000
	—216	—56,000	+1,549,000

The accompanying chart illustrates the progress of mechanization in Illinois since 1929, when mechanical mining had passed the experimental stage and was recognized as a coming development in the coal industry.



Tonnage Mined in Illinois, 1929-1944

Loading and Haulage Changes Most Significant

In summing up the changes during the past 25 years, the development of stripping methods to produce a clean, desirable product, competitive with deep-shaft coal on a quality basis, and the utilization of modern machinery to replace manual methods, are the outstanding items. Chief among the mechanical methods are the loading machine to replace hand shoveling, modern high-speed rail haulage with large pit cars, the replacing of track haulage by rubber-tired haulage and belt haulage, and the use of mobile trackless equipment. These improvements have made it necessary to utilize skilled employes in the mining of coal, similar to the skilled employes utilized in manufacturing plants. The modern miner is now a skilled machine operator or a skilled mechanic.

From the above it will be seen that the change in methods has required an educational program with which the employes have kept step every part of the way.

Economic Aspects of the Greenbrier Field, West Virginia

By WILLIAM CRICHTON

Secretary
Greenbrier Smokeless Coal Operators Association

THE Greenbrier Coal Mining Field is located principally in Greenbrier, Nicholas and Fayette counties of West Virginia. Among the group of fields producing high-grade smokeless coal from the Southern West Virginia area, this district is the youngest. The first real attempt at development was made during the winter of 1920 and the first rail shipment followed in 1921, except for some little tonnage of record since 1907. Each year the coal produced from this district has met with increased favor as the large industrial users and the domestic consumers have become acquainted with its particular merits.

The greater portion of the tonnage being mined comes from the Sewell seam with some development in the Beckley, Fire Creek, and Pocahontas seams. The Sewell, being the most accessible, has been more extensively mined than the others but they too will be developed as rapidly as the market expands, since they all contain high grade smokeless coals.

Steady Increase in Annual Tonnage

In the 24 years since 1921, when the first rail shipment was made over the Greenbrier & Eastern Railway, the production per annum has increased from 52,000 tons in the first year to nearly 3½ million tons as a maximum yearly tonnage. This tonnage has been absorbed partly at tidewater, where it was trans-shipped either for export to foreign countries, for bunker coal, or for coastwise trade. It is also used in large industrial steam plants, by the railroads, and by the domestic markets.

The operating companies produced 3,209,484 tons in 1944 which to date is the district's best production year. There are many truck mines in this territory of which there is no record as to ownership or what tonnage is produced, but it is general opinion that this will run anywhere from 50,000 to 100,000 tons annually.

From a report made by the State Department of Mines a few years ago original coal reserves in this district were 2,175,000,000 tons, 70 percent of this is estimated as available to markets. Up to the first of 1945, there has been mined from this reserve approximately 50,000,000 tons, which still leaves a lot for the future.

Greenbrier coal averages approximately 15,000 B.t.u. to the pound and the average ash content is about 3½ percent. Uniformity of heat content and small variation in ash content are characteristic.

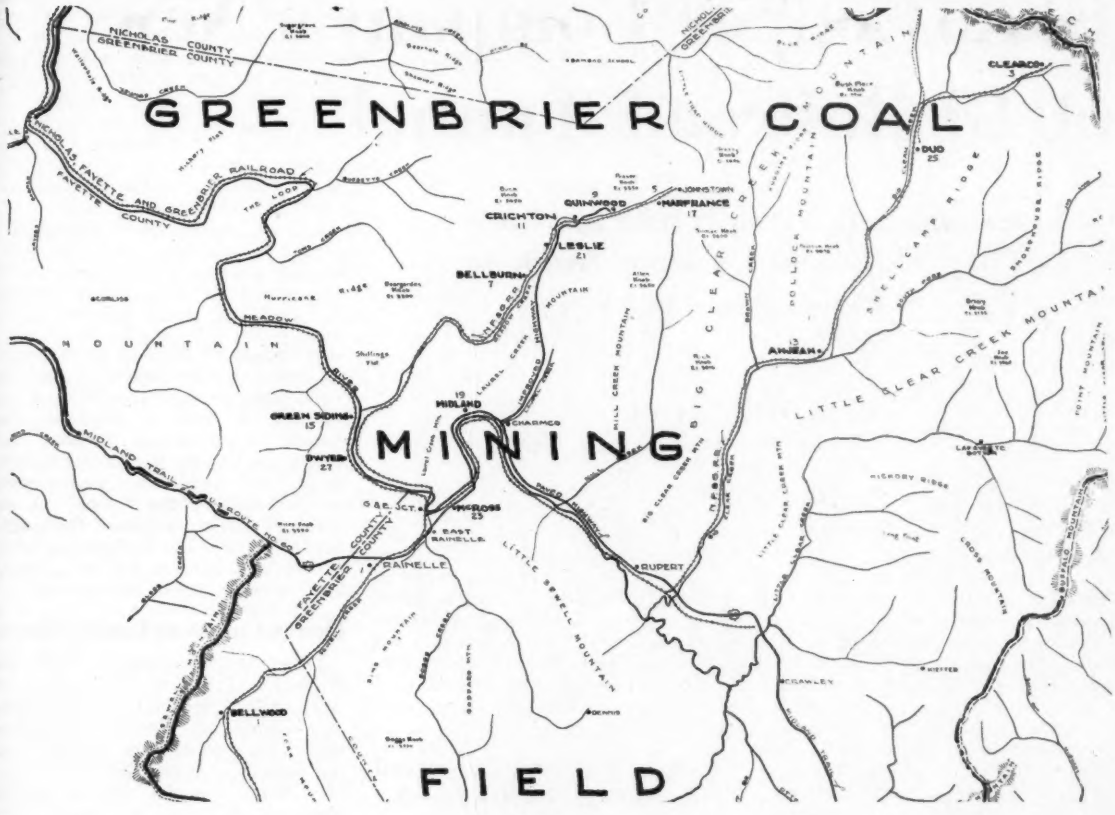
Excellent Railroad Facilities

The Sewell Valley Railroad was built in this area in 1909 to gain access to the timber owned by the Meadow River Lumber Company. This company endeavored to interest various coal operators in the field, but it was then the consensus of opinion that nothing much would be done in Greenbrier coal fields until the New River district mines were completely worked out. The railroad came over Sewell Mountain by the use of four switchbacks. It's construction was followed closely by the Loop and Lookout Railroad and both together extended rail facilities from the main line of the Chesapeake and Ohio Railroad at Meadow Creek Junction, through the growing city of Rainelle to the town of Nallen. Then the Greenbrier and Eastern was constructed from a point near Rainelle to Johnstown, passing through the mining camps which were being built along with the extension of the rails.

In 1926 the Chesapeake and Ohio Railroad, realizing the enormous tonnage of high grade smokeless fuel available, purchased the Greenbrier and Eastern Railroad together with the other lines and followed these purchases by making improvements and extensions. Later, the Chesapeake and Ohio and the New York Central Railroads formed a joint company called the Nicholas, Fayette and Greenbrier Railroad, which absorbed all the rail facilities in this area and built 33 miles of new line. In the past two years the lines have been extended another 10 miles with plans and permission now available to extend another 5 miles. Completion of this extension will allow the district to reach its peak tonnage.

Something novel in railroading is practiced here. The operation of the Nicholas, Fayette and Greenbrier Railroad is supervised in the odd num-

Typical mountain topography in the Greenbrier field



bered years by the New York Central Railroad and in the even numbered years by the Chesapeake and Ohio Railroad without any change in personnel or equipment. Today coal moves out by direct connections to the Chesapeake and Ohio, the New York Central, and the Virginian railroads, which distribute it throughout the eastern and central western United States. The ever decreasing time of transit achieved speaks well for this particular form of management.

Mining Plants are Modern

Since this mining field is young in years, the surface plants built by the various companies have incorporated latest practice. The coal tipples are fully equipped to properly size, prepare and treat coal for the particular markets which the various companies serve. Some properties have washers because their coal is mined by modern methods and machinery. The practice is to thoroughly inspect the coal at the face for impurities, size it by shaking screens in most cases and run it over picking tables, where it is manually cleaned of the balance of the impurities. Finally, it is loaded into the railroad car by loading booms which deposit the coal with minimum breakage.

Practically every comany in the district has done some experimenting with the various forms of mechanical loading—mobile loaders, chain conveyors, and shaking conveyors with duckbills. Varying degrees of success have been attained but it would seem to the writer that the coal seams in this particular locality do not lend themselves as readily to successful mechanical loading operations as they do elsewhere.

The Greenbrier Smokeless Coal Operators Association has been active in coordinating mining activities and solving the problems affecting mining welfare, since the year 1922. And it has been more particularly active since 1933 and the advent of the NRA under which our mines were organized by the United Mine Workers of America.

The mining companies, although for the most part medium producers, have built up modern towns with fine schools, well built houses and churches. The school facilities include high school buildings, as well equipped as money and science can provide. These advantages impress a community with a morale that bespeaks satisfaction and contentment. They are difficult to supply in many instances, but the mining communities are most fortunate which enjoy them, because they add so materially to human happiness.

Besides the county schools, the Greenbrier Military Academy and the Greenbrier College for Women, both located in Lewisburg (which trace their origins back to the academy founded by the Rev. John McElhenney in 1812), provide higher educational advantages for those who seek them. Operators at the present time employ about 2,000 employes in and around their mines. This represents a population of approximately 10,000. Under normal conditions around 3,000 men are employed.

While it would seem to most of us that very little tonnage is being produced this year, we feel quite sure that when the final record is made, we will have mined as much coal in 1945 as we did in 1944, if not more.

Editor's Note: A continuation of this absorbing series of articles, depicting developments in other coal fields will appear in the next issue of THE MINING CONGRESS JOURNAL.

Utah Copper Company's New 6040 Railroad Tunnel

New Approach Will Probably Be in Use Some Time in 1946. Its Construction Will Remove Necessity for Adverse Haulage of Pit Ore

By GEORGE C. EARL
Chief Engineer

A NEW railroad tunnel 4,650 ft. long to provide an outlet for sub-level ore is now nearing completion at the Utah Copper mine at Bingham Canyon, Utah.

Known as the 6040 tunnel, it was driven by the Utah Construction Company under a contract awarded in December, 1943. Excavation began January 1, 1944, and the tunnel was finished except for track and electrification on July 1, 1945. The outlet portal is located in lower Bingham Canyon, and the tunnel runs in a general southwesterly direction towards the present Utah Copper pit. Mining is now down to the 6090 level from the pit, or a vertical distance of 100 feet. The new tunnel, when placed in use, will thus remove the necessity for adverse haulage of pit ore. The pit end of the tunnel is still to be reached by mining operations and the time when the transportation tunnel can be put into use will depend upon the rate of ore production. However, the tunnel level should be reached sometime next year.

Jumbos, Cherry-Picker and Mechanical Mucker Speed the Work

All work was carried on from the north, or outlet, portal, since the south portal was inaccessible. Full face heading method was used in driving, except through short sections of heavy ground where a top pilot drift was necessary. Drilling was carried on from a structural steel jumbo, on which was mounted eight drills. A cherry picker for passing empty and loaded cars was mounted on the rear of the jumbo. A mechanical mucker was used for loading into 5-ton cars and haulage out of the tunnel was handled by 36-in. gauge battery and diesel locomotives.

Heavy Concrete Lining Placed

After the excavation, which was finished in February of this year, the work of concrete lining of the tunnel was commenced. Concrete lining was placed for a distance of 3,784 ft. from the outlet, or north portal. Temporary lining for the concrete section consisted of 6-in. "I" beams and 8-in. x 8-in. wide flange beams, curved to tunnel contour and spaced from 2 ft. to 7 ft. on center depending on ground conditions and lagged with 2-in. fir. The remainder of the tun-

Concrete mixing plant and temporary contractor's buildings erected at north portal

nel, or 866 ft., was lined with timber as the tunnel was driven. The timber-lined portion of the tunnel will be within the ultimate pit limits and will be gradually dug out as mining operations progress. The timber-lined section consists of 12-in. x 12-in. fir sets spaced 4 ft. on center and lagged with 4-in. material. The concrete was mixed in a plant outside the tunnel and transported in 4-cu. yd. agitators, from which it was deposited into a pneumatic drum and shot into place through a 6-in. pipe. Steel forms were used throughout. The concrete lining has a minimum thickness of 10 in. and averages about 14 in. for the entire length. No reinforcement was used except through sections where heavy ground was encountered.

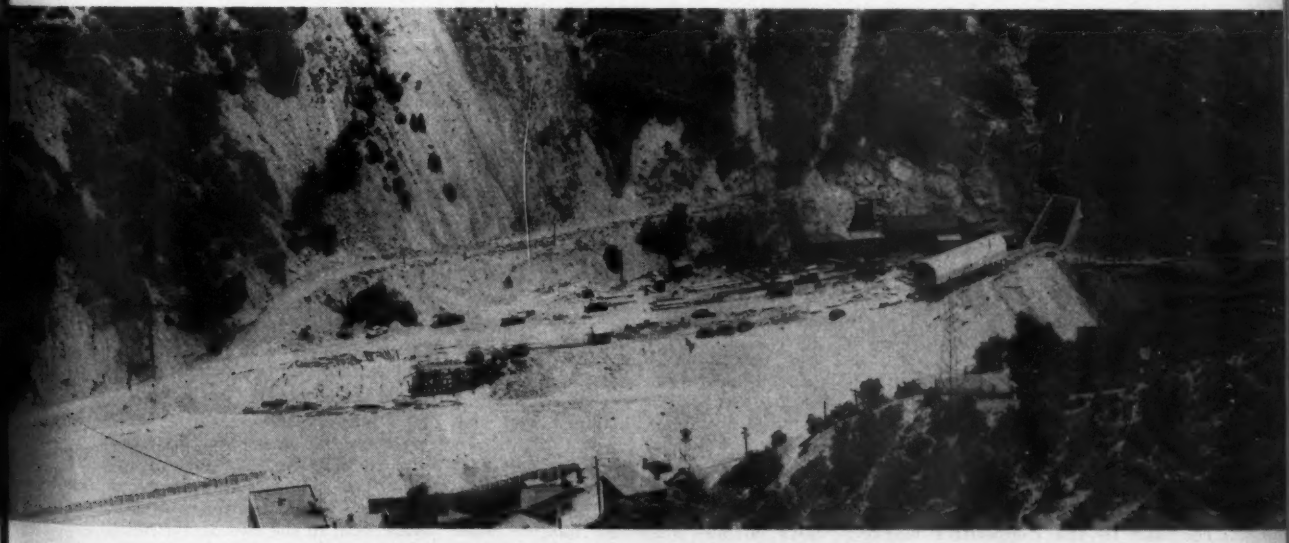
Heavy Rail and Long Ties

A standard-gauge track will be laid in the tunnel with 131-lb. rail on 9-ft. creosoted ties, which work is now in progress. From the north portal the tunnel has a plus 2 percent grade in the concrete section and a plus 0.5 percent in the timber-lined section.

Approximately 80,500 cu. yds. of material was excavated and the tunnel was driven almost entirely in quartzite until the Utah Copper porphyry ore body was encountered about 4,000 ft. in from the north portal.

Approximately 1,000,000 board feet of timber lining was installed in the tunnel and the concrete lining required approximately 10,000 cu. yds. A total of 145,000 lbs. of powder was used, equivalent to 1.8 lbs. per cu. yd. of material.

Concrete lining was placed for a distance of 3,784 ft. from the north portal. Its minimum thickness is 10 in. and reenforcement is used only in heavy ground. The pit end of the tunnel is timbered as it will be dug out in mining operations



A movable form was built to facilitate the work of concreting the tunnel

Mechanical loaders and conveyers successfully solve the thin seam problem

Mobile Loaders in Thin Seams

Equipment Set-ups and Operating Plans Involved in Types of Thin Seam Operations Which Employ Mobile Loaders Discharging into Conveyors or Shuttle Cars

By E. H. JENKS
Chief Engineer
Rochester & Pittsburgh Coal Company

THIN seam mining is becoming a problem of interest to more people in the industry each year as the higher seams become depleted and the search for better quality brings thin seams to the front. All problems of high coal are present in low coal but are multiplied due to the larger area which must be covered to produce the same tonnage; and to this is added the greater problem of working height.

Mechanization of thin seams has trailed the thick seams, because it is so much simpler to build machines to operate where there is plenty of height; therefore the first mechanization was in the higher coals. Every inch of height that a machine must be reduced adds to the problem of producing a sturdy workable model. Machines are now available to work in seam heights down to about 3 ft. but the selection is very much narrower than for seams above 4 ft. The present war situation has slowed up the development of mining equipment but on the other hand many mines have been opened in thin seams to get tonnage needed for the war. At least some of the owners of these mines will continue in the competitive market, post-war, which will therefore create an added demand for low equipment. Probably the manufacturers of mining equipment will be speeded up in providing machinery to meet this demand.

Hand loading into mine cars requires so much non-productive work that I feel sure it will be practically eliminated as far as the competitive market is concerned when we get back to normal conditions except perhaps in a few mines where there is some highly favorable natural advantage, but even then hand loading involves so much waste of energy that it is not economically sound.

Hand loading into conveyors was the first step ahead and it does eliminate a good part of the non-productive work. Machine loading into conveyors was the next step, or machine loading into shuttle cars, although at the present time we feel that about 42 in. of seam height is the minimum for shuttle car operation. Reciprocating conveyors with a loading head can be applied in coal lower than this.

One mine (shown in the accompanying map) where the seam is as low as 34 in. is operating very satisfactorily with mobile machines loading into conveyors. The main and secondary haulage is by locomotives with mine cars as large as clearance and curvature will permit. Belt conveyors are installed in the headings from which rooms are driven.

Conveyor Set-ups and Equipment in Entry Driving

Main and secondary headings are driven in sets of four or six. Each heading has a conveyor which can be extended to 300 ft. These conveyors load into a cross conveyor which in turn empties into a mother conveyor from which another cross conveyor loads the coal into mine cars on the main heading. Bottom is taken for head room in the two center headings. By alternately using the mother con-

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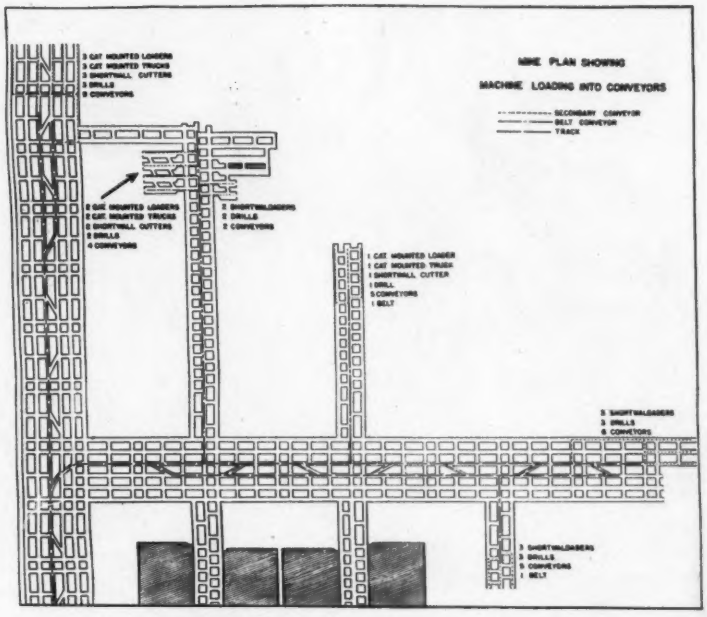
veyor in the extreme right and then the extreme left headings, bottom rock can be taken as the heading advances so that continuous advancement of the heading can be maintained, the only delay being at the time of the advancement of the conveyors each 300 ft., which may take as much as three shifts.

A caterpillar mounted loading machine, a caterpillar mining machine truck, a shortwall cutting machine and a hand-held electric drill are used in each two headings. In a six-entry system this means three loading machines, three machine trucks, three cutting machines, three drills and nine conveyors, operated by 12 face men, one supply man, one boom man, a mechanic and a foreman. The same results can be achieved in this system by a shortwaloader to replace the loading machine, the caterpillar truck and the cutting machine, using only six conveyors. In this latter case the three right and three left headings are alternately advanced. This set-up requires the same crew but will give more rapid advancement as each face crew remains continuously in one place with no moving from one working face to another. It also permits driving narrow headings where the roof will not permit the width necessary to move machines past conveyors.

Rock is taken in the above places either with a track-mounted mucking machine or a mucking machine of the scraper type, loading into mine cars.

Gathering Belts in Panels

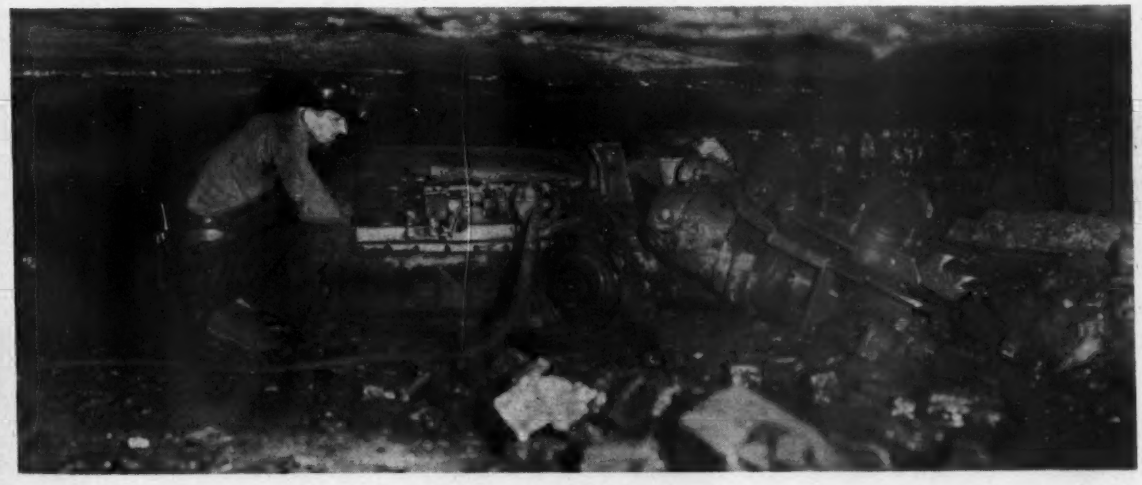
Room work is driven by the same system as heading work, except that each room conveyor empties coal into a belt conveyor which runs the full length of the room heading. Either two or four machines are used in the panel. Again this system can be followed with shortwaloaders with only one-half the number of places open at one time. The only bottom rock taken in room headings is a pathway along the belt and it is seldom necessary to load any rock from the room headings.



When the seam is comparatively flat, dipping less than 4 percent, room headings may be driven both right and left from the secondary headings. In this particular case the dip headings are 1,800 ft. long and the rise headings 2,200 ft. long, these distances were adopted because that was about the length at which the semi-stationary belt conveyor used could be operated in the reverse direction.

In a mine where the seam is from 42 to 48 in., a system very similar to that outlined above is used, except that the loading machines are high capacity and the conveyors are replaced with shuttle cars. Only one machine is used in advancing headings, working all places; and two machines are used in a room panel, each working five or six rooms. Conveyors can be used to take coal from a high capacity loading machine but they are so heavy that it is all but impossible to get crews that will work with them.

The prime purpose of a mechanization program is to make more productive use of human energy and as the greatest waste of energy in a low seam is traveling through the low places, any system which prevents this traveling will prove to be most unsatisfactory both as to the tons per man employed and cooperation from the man.



Tractor machines replace hand loading in low coal

Left to right: Quincy drainage and transportation tunnel; Dwyer drain and transportation tunnel through which new developments have been made

Left to right: Paul T. Allsman, chief, Mining Branch, U. S. Bureau of Mines, Salt Lake; George H. Watson, president, Alta United Mines; J. I. Kasteler, U. S. Bureau of Mines; S. R. Zimmerly, chief, Metallurgy Branch, U. S. Bureau of Mines, Salt Lake; Jack Carter, Utah Copper Co.

Mining Revived at Alta

Recent Developments at the South Hecla Mine of the Alta United Mines Company Indicate Eventual Rehabilitation of Once Famous Silver Camp

★ ★ ★

By GEORGE H. WATSON
President and General Manager

★ ★ ★

THE PROPERTIES of the Alta United Mines Company are located in the Little Cottonwood mining district, situated at the head of Little Cottonwood Canyon, Alta, Salt Lake County, Utah. This area lies 28 miles southeast of Salt Lake City and is reached over a hard surfaced highway of moderate grade.

The Alta region was in its heyday by 1868 but since the demonetization of silver in 1873, the camp has enjoyed only spasmodic periods of boom-time production. World-famous mines lie dormant in this area suffering from a lack of adequate drainage facilities.

Bismuth Possibilities Investigated

In November, 1942, the Bureau of Mines entered this ghost camp and began investigating the possibilities of bismuth and tungsten production in the Dwyer tunnel of the South Hecla mine of the company. The South Hecla is one of 34 mining corporations consolidated into the Alta United Mines Company. Tungsten soon lost its importance as a critical metal so efforts were concentrated in the bismuth area of the mine because bismuth remained critcially in demand.

Ore Bodies Found at Intersection of Fissures and Certain Limestones

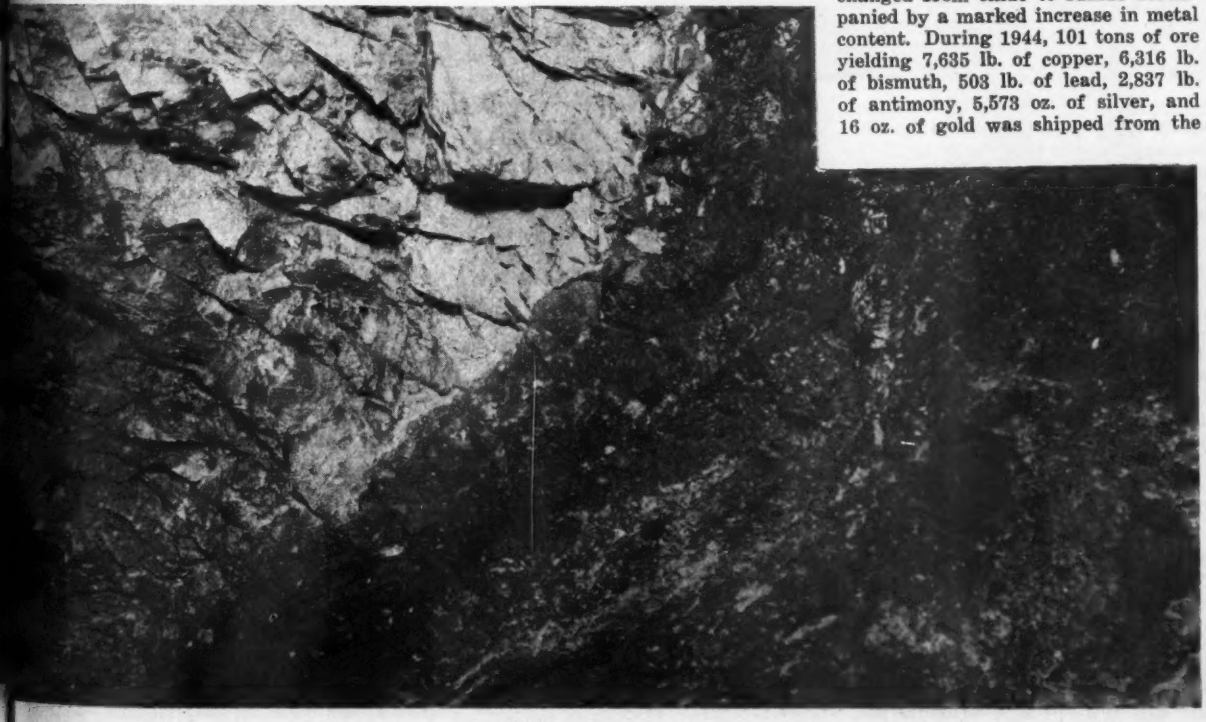
Geologic features in the immediate vicinity of the South Hecla mine consist of a series of uniformly bedded strata ranging from lower Cambrian to Middle Mississippian in age. These strata trend in a general north-south direction and dip eastward, and are intersected by a series of strong east-west fissure zones. Ore bodies are found at the intersection of the fissures with the following limestone horizons:

1. The Ophir and Maxfield limestones of lower and middle Cambrian age.
2. The Jefferson dolomite of Devonion (?) age.
3. The Madison limestone of lower Mississippian age.
4. Several places in the thick Deseret limestone of middle Mississippian age.

The eastern edge of the South Hecla property contains the Alta overthrust fault which produced the bulk of the ore bodies in several mines located north of the South Hecla but which has never been prospected in this area.

Exploration Activities Reveal Sulfide Ore

A winze was sunk by the Bureau below the Dwyer tunnel level to determine the continuity of No. 2 ore shoot of the bismuth ore zone. This shoot had previously been mined from surface to a short distance below the tunnel level—a length of about 700 ft. At a point 40 ft. below the level the ore was cut into and was found to have changed from oxide to sulfide accompanied by a marked increase in metal content. During 1944, 101 tons of ore yielding 7,635 lb. of copper, 6,316 lb. of bismuth, 503 lb. of lead, 2,837 lb. of antimony, 5,573 oz. of silver, and 16 oz. of gold was shipped from the



Hanging wall of the bismuth-copper-silver ore body in the Bureau of Mines winze at the 30-ft. level

If more skilled miners were available, rehabilitation of other mines would probably take place and more trains like this one in Dwyer tunnel would be hauling ore

The Kate Hayes ore body is 7 ft. thick. Dip is 70 degrees

winze. Recent developments by the company indicate that the 40 by 12-ft. horizontal dimensions of this ore body on the tunnel level will be exceeded at greater depths.

Two other ore bodies, each containing about 1,000 ft. of backs, were cut by the Bureau's workmen while driving along the course of the Kate Hayes fissure. In the Maxfield lime horizon the drift passed through 70 ft. of oxide ore averaging 2½ ft. thick. Fifty-one tons of this ore shipped in 1944 yielded 4,845 lb. of lead, 1,501 lb. of copper, 642 lb. of bismuth, 1,559 oz. of silver. In addition the ore contains 1.8 percent tungstic trioxide for which no payment was recived.

At the intersection of a faulted segment of Ophir limestone with the Kate Hayes fissure, the Bureau drift penetrated 74 ft. of sulfide mineralization averaging 4½ ft. thick. Ninety-nine tons was shipped from this zone which gave a settlement assay of 6.2 oz. silver, 1.0 percent copper, and 0.70 percent bismuth per ton.

Current Ore Finding Developments

At the present time the Bureau of Mines is driving a drift south from the Kate Hayes drift to attempt to intersect the downward extension of the Native Copper surface ore body. This ore body formed as a large replacement zone at the intersection of the Ophir limestone with the Native Copper fissure. Although the projection is over 900 ft., this fissure zone has already been cut in the Ophir shale and raises are being driven upward to cut the overlying lime.

The results of this exploration program have been significant for the following reasons:

1. Before the Bureau of Mines and the U. S. Geological Survey began active work in this area, the Alta District was considered to be a "worked out" area notwithstanding the fact that many of the mines contain faces of ore bottomed under water.

2. It has been demonstrated that the ore bodies of the district persist to greater depths than formerly believed possible. Also, the metal content has increased as added depths were attained.

3. Numerous surface outcrops lie in the region south of the South Hecla property. The success of the Bureau of Mines in intersecting some of these outcrops at depth enhances the possibility for greatly increasing the indicated ore reserves of the district.

Geologic Observations Indicate Favorable Zones

Investigation of this immediate area by the U. S. Geological Survey has led to a number of geologic observations concerning favorable zones in which development work is warranted. In addition to the ore shoots now opened, eight other ore bodies are known to exist in the Dwyer tunnel—but are in a caved condition at the present time. The Quincy Drain tunnel contains several ore bodies which were worked over 20 years ago. This tunnel will be reopened in the near future as will the Albion and Rustler mines, substantial producers at the turn of the century.

Because of the present shortage of skilled miners the work of rehabilitating old ore zones will probably progress slowly for some time. Eventual rehabilitation is certain, however, and coupled with increased activity at other mines in the district should lead to a substantial era of production in the Alta district.

Duckbill Loading in Low Coal

The Unique Problems Involved and Methods of Mining Low Coal With Shaking Conveyors and Duckbill Loaders

This system permits simultaneous, co-ordinated cutting, drilling, shooting, loading and transportation operations

By VAN B. STITH
General Superintendent
Anchor Coal Company

IN A discussion of any method of mining in a thin seam the first item to be determined is what constitutes a thin seam. Personally, I have passed through a period during my time as a production official when I considered a seam under 4 ft. to be low coal but later on I have become convinced that any thing above 36 in. is a thick seam. My comments therefore will be confined to mining coal with conveyors in seams 30 in. and under, where the first problems of mechanization are: (1) Equipment to be used. (2) Methods of mining. (3) Preparation of coal. (4) Power supply. (5) Results reasonably expected.

Wide Choice of Equipment to Select From

There is available a very wide choice of equipment for thin seams; those most commonly used in this class of mining are conveyors—belt, chain and shaker—low vein loading machines and drag line skips or boxes. The selection of the type depends upon the natural conditions of the seam to be mined, some of the major items of attention being the nature of roof, contour of seam, necessary drainage and impurities in the coal. After much experimenting with chains and shaker conveyors, our company selected the shaker conveyor and duckbill loader as best suited to our conditions. We are mining a seam of coal with an average thickness of 28 in. but our preparation methods make cutting in the mine floor prohibitive; therefore we have to cut in the bottom of the seam and consequently our mining thickness is reduced to 25 or 26 in. of coal.

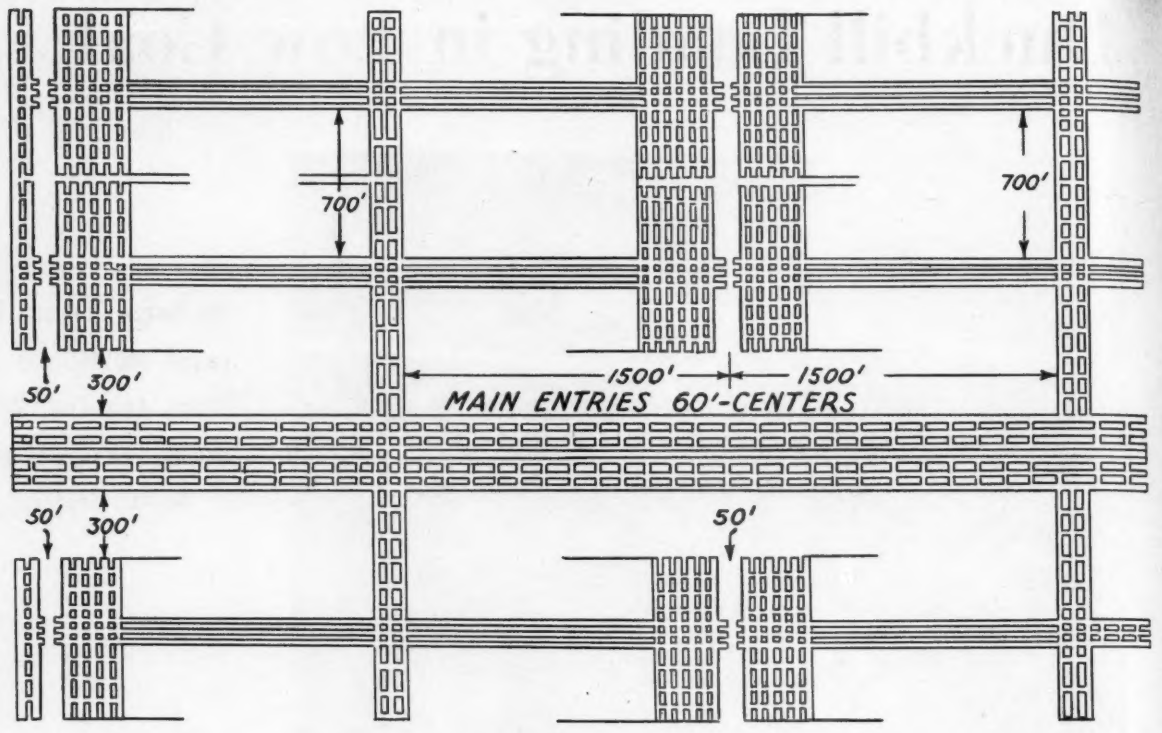
(Editor's Note: This paper was prepared by Mr. Stith for discussion at the American Mining Congress convention in Cincinnati but a change in the program prevented its presentation.)

Advantages of Shaker Conveyor

Hand loading coal onto conveyors in a seam under 36 in. is a very difficult matter as well as a very costly one. The shaker conveyor is easily and cheaply moved from place to place and permits a very quick extension to the face, handles the coal with a minimum of breakage, is simple to inspect as it operates, lends itself to the extraction of pillars readily and is most economical in maintenance and consumption of power. The duckbill is a very flexible piece of mechanical loading equipment with a comparatively low initial cost, as well as being simple to operate, maintain, move and extend at the face.

Panel Entry System and Continuous Cycle at Face Found Best

The panel entry system of mining in my judgment is the best system for conveyors in thin seams, or at least a semi-panel system. Ventilation of the panel is a simple matter, haulage and delivery of supplies is simplified, and last but not least, isolation is possible. The operating method best used at the



The panel entry system is excellent for conveyors in thin seams. Ventilation, haulage and delivery of supplies is simplified and isolation is possible

face, I believe, is what is known as the continuous cycle system. Where rooms are driven as much as 30 ft. wide, one side of the face is being loaded while the other side is being cut and prepared for blasting; also, if lump coal is an item, this method provides for blasting at least half of the coal with a loose end. The duckbill and shaker conveyor fit right into this cycle system, as the duckbill operates on a swivel at the face and readily reaches the coal 15 ft. from the center either way. The loading head is pulled up and conveyor extended by the mining machine at such times when the mining machine is located off center of place being mined. The dimensions selected for room centers, entry center, both main and cross as well as the overall panel size depend upon the nature and thickness of over-burden and whether or not pillars are to be extracted. Personally, I prefer leaving very small room pillars on the advance, then forget them and the panel system of mining, if properly projected, will permit this.

Special Labor Problems Involved

If a thin seam is to be mined in a thick coal locality trouble is ahead, although, in normal times, the thin coal may possibly be of such quality that it can be operated more regularly than the thick seam. In any event I

The short, compact machine is suited to use in close posting

would advise keeping the production strictly in line with the disposal so that full-time operation can be effected. Men working in low height on their knees and stooped over, do very well on full-time operation, but, let them remain out of the mine for three and four days at a time, and they will find upon their return that their knees and muscles have become soft and the production suffers accordingly.

The Training of Labor Is Best Done on the Job

Training the men working on conveyors in the mine should take place right at the face under a good foreman and once a crew becomes efficient I am very much against taking any men away in order to improve the performance of another crew. If the other crew is not getting results, a good foreman should be with them and suffer the decreased output until either by training or weeding out they become a good crew. By keeping men together they learn each other's ways, learn what each has to do and just when to do it. It is true that mechanics and repair men can to some extent, be trained outside the mine for many jobs; however, even in the repair department the actual application of shop trained methods takes on new aspects at the face. For instance changing the bevel gear on a mining machine in 25 in. of coal has its problems. The machine can of course be taken outside for repairs and another brought in, but if the working place is in 200 ft. or better you can shoot out top or bottom, turn the machine upon its side and make the repairs underground in less time than is needed to exchange the equipment from the outside. The very best way to move a machine out of a working place in thin coal is to move it with its own power.

Supply Delivery Can Be Well Organized

Training men in the art of the delivery of supplies to the working sections is very necessary; the method used is all important and an easy and efficient way for getting conveyor pans, posts, cap pieces and tamping bags to the face is known as the "dead pan method" which operates in the following manner: When a place is driving and the conveyor is being extended after each cut, then, in addition to the conveyor line, a dead line of pans is bolted together and laid parallel to the conveyor. On each pan is wired sufficient posts, caps, rock dust, tamping bags, etc., required at the face for one machine cut. As the place advances, additional pans are bolted onto the end of the line at the room neck and the mining machine pulls up the line toward the face where one pan with its supplies is taken off and used to extend the conveyor. Once the half-way point in the driving is reached, no further pans are added to the dead line but it continues to be pulled up and the front pan taken off and used until the last dead pan comes to the face as the advance is completed.

Features of Power Supply

Power supply is vital. The proper amount of power should be maintained at the point of consumption. Too great an amount of power in connection with the shakers is bad practice as it causes the conveyors to operate beyond rated speed, but at the same time there must be capacity to do the job. Power transmission and distribution is a huge problem and therefore I will leave this subject with just this remark: *The manufacturer's rated voltage of the equipment must be maintained.*

Results to Be Reasonably Expected

With the shaker conveyor and duckbill on cycle operation at the face, mining a seam of coal 30 in. and under, you can reasonably expect an output per man (including supply man, foreman and every man at the face) of 10 to 12 tons while the conveyor is operating. To do this, a continuous car supply must be maintained if mine cars are used. This can be done by several methods of which the loop loading is most common. If mine cars are used, the problem of brushing roof or bottom must be considered (which is a subject in itself) however, we employ a low vein loading machine and air compressor for this work. Lifting bottom in a 28-in. seam creating a haulway with a 4-ft. height will be approximately 5 percent of the labor cost; likewise for moving the equipment the labor will be another 5 percent of the total labor cost. Output for all labor in and around the mines should be between four and five tons per man which will increase as production increases up to a certain point.

In conclusion, I will say that in thin seam operation, a cost as low or lower than with mechanical equipment in thick seam should not be expected. It just cannot be effected. However, the conveyor system of mining has a definite place in the industry, inasmuch as it makes possible the operation of thin seams that otherwise would remain unmined. Thick seams are fast becoming exhausted and the conveyor is therefore with us to stay.

Atomic Power Possibilities

A Statement by Dr. M. Lelyn Branin, Technical Consultant, Bituminous Coal Institute and head of the Chemistry Department, Pennsylvania Military Academy

WHAT will be the effect of the new atomic development upon America's richest and largest natural resource, its more than 3,000 years supply of coal?

During the lifetime of adults now it will probably have little effect. So far, the atom is only known to have been harnessed for explosive purposes. The eventual utilization of atomic energy for peacetime purposes does appear to be most promising.

In time, a long time, it will be developed for peaceful pursuits, but it will undoubtedly be generations before the atom will make all of the nation's steel, power the nation's locomotives, generate the electricity or furnish the billions of hours of industrial horsepower that coal does now, let alone heat the nation's homes.

As yet there is no promise that the atom can be formulated to substitute for the 200,000 commercial products and chemical compounds that stem from bituminous coal. America's coal reserves are still the greatest single storehouse of raw chemicals in the world. Thus, in addition to the 40,000 quatrillions of B.t.u. energy units that rest beneath the nation's hills and mountains, coal is an almost boundless reservoir of elements for producing comforts and health, helps for the people.

What the cost will be for atom energy is only a guess. Certainly it will be tremendous for many years, judging from the $2,000,000,000 now invested in its initial development only.

Coal, on the other hand, is and will long continue to be the nation's cheapest commodity, cheaper at the mines than good grades of sand or gravel.

Because of its cheapness, abundance, and diversified uses, coal will be America's chief energy servant for many years to come.

Oxidation of Lead Sulfide

By DOUGLAS GARDNER
University of Utah

THE PRELIMINARY roasting of lead sulfide (galena) ore, the most common source of lead, is one of the most important steps in its treatment. Due to the low fusion temperature of the galena and its brittle, friable nature, together with the need for a strong hard porous particle as feed for the blast furnace, ordinary roasting methods were not satisfactory. To treat galena then, a blast roasting or sintering method was developed. However, the low fusion temperature and the facts that lead sulfate formed in the reaction and some lead sulfides are not decomposed at the fusion temperature, require very careful control to remove the sulfur to the required amount.

The rate at which decomposition of lead sulfide proceeds, how nearly complete the reaction is and the nature of the reaction products are factors involved in this control.

Improved Flotation Practice Presents New Smelting Problems

As flotation practice has improved, concentrating mills have been shipping higher grade fine grained concentrates to the smelters. These high grade concentrates have increased the difficulties involved in control of the roasting operation through reduction of an increasing proportion to the metal and volatilization in the sintering machines. To avoid this loss many smelters dilute the high grade concentrates with lower grade ore or with worthless gangue. Either diluent effectively reduces many advantages of a high grade ore and especially the use of a gangue increases treatment costs and loss of metal in the slag unnecessarily.

This report is a study of the rate of decomposition of lead sulfide, and the nature of the reaction products.

Preparation of Materials Used in the Tests

The materials used were "C.P." precipitated lead sulfide and galena. The precipitated lead sulfide was used with no further preparation. The galena was carefully sized to $-100 + 150$ mesh and adhering fines removed by washing on a 200-mesh screen with a fine spray of water. The washed galena was then cleaned with ammonium acetate solution to remove any oxidation products. The galena was cleaned by boiling it in concentrated ammonium acetate solution for one hour and then letting it cool in concentrated solutions of ammonium acetate with frequent agitation for ten days with three changes of solution in that time. The acetate was then drained off and traces removed with hot distilled water and the water subsequently removed with methyl alcohol. The resulting "cleaned galena" was dried and stored in a tightly stoppered bottle from which all of the air had been displaced by dry CO_2.

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Galena, from which all traces of oxidation products had been removed, was roasted in an electric tube furnace under a current of dried air for two-hour periods.

At 275° the sulfate sulfur amounted to 0.61 percent and the SO_2 to 2 percent of the total sulfur. The proportion as sulfate increased up to 725° when sulfate sulfur in the residue was 34 percent of the total sulfur. Above this temperature the decomposition of the sulfate reduced the proportion until at 775° only 17 percent of the sulfur was in the form of sulfate.

Evidence is presented to show that lead sulfate is a primary and not a secondary product.

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Apparatus

The sulfide was treated in an electric tube furnace arranged as in Figure I. The air was dried by bubbling it through concentrated sulfuric acid and then passing it through a drying column containing calcium chloride desiccant. A hard glass tube was used for experiments at the lower temperatures, and a porcelain tube for all temperatures over 500° C. The material to be treated was spread evenly over the bottom of a 6-in. porcelain boat which was placed in the tube in the center of the furnace. In two of the experiments two boats were used as shown by dotted lines in Figure I. The gas leaving the furnace was drawn through a standard iodine solution in a primary and two stripping absorption tubes, and then a gas meter and a flowmeter.

The temperatures were measured with a Chromel-Alumel thermocouple having the hot junction over the center of the boat, and connected to a Leeds and Northrup potentiometer. The temperatures were controlled by varying the voltage with a Varitran voltage regulator.

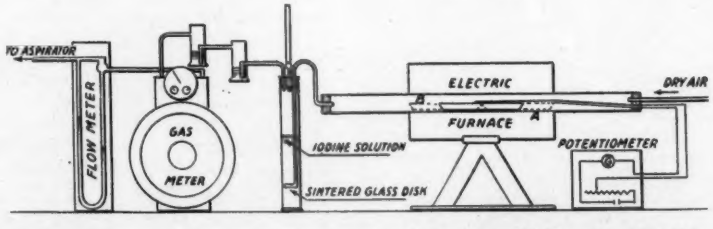


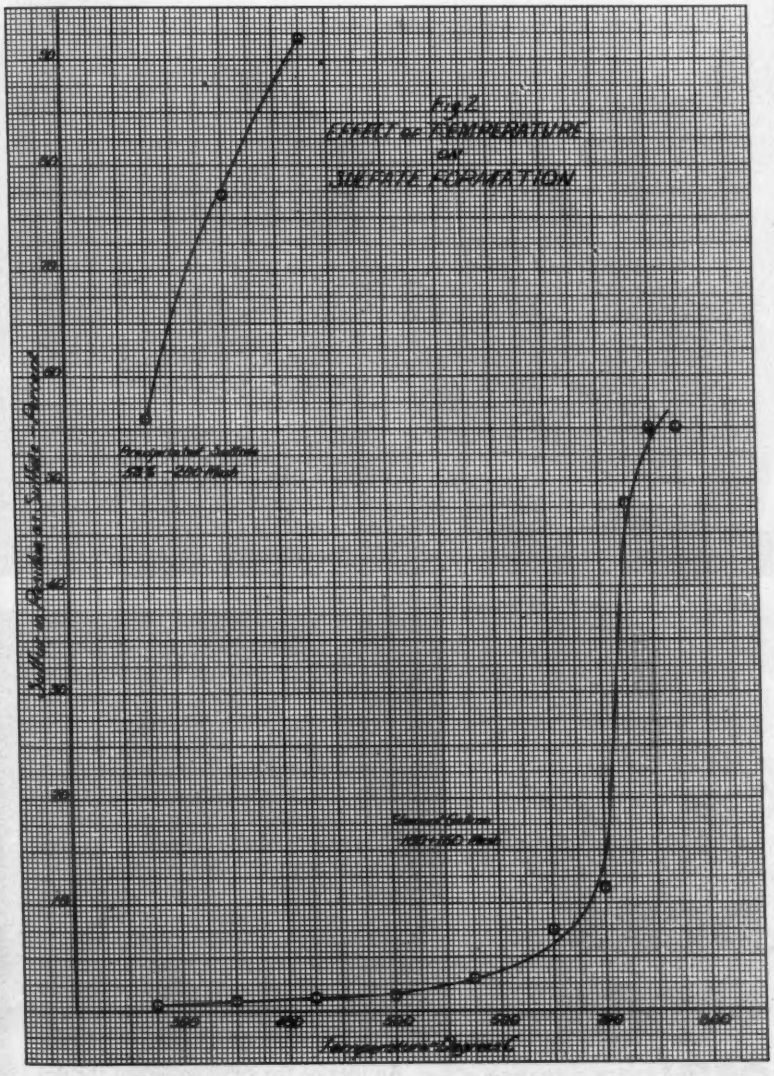
Fig. 1. Diagram of apparatus set-up used to determine oxidation characteristics

Procedure

Five grams of the sulfide material was spread evenly over the bottom of the 6-in. porcelain boat which was then placed in the center of the tube of the furnace while the furnace was cold. The tube was then connected to the air drying train on the air inlet end and the absorption tubes containing the standard iodine solution. The temperature was rapidly raised to the desired operating temperature and maintained constant for two hours, while drawing dry air over the charge and through the solutions at the rate of 5 cu. ft. per hour. After two hours the furnace was rapidly cooled to below 200° and the sample removed, placed in a dessicator and allowed to come to room temperature. The residue was weighed and analyzed for total sulfur and sulfate sulfur. The iodine solutions were then combined and titrated with standard sodium thiosulfate to determine the amount of SO_2 absorbed.

The extraction of total sulfur was effected by converting the sulfur to soluble sodium sulfate, and leaching in boiling water. This conversion was made by roasting the sample at 800° C. with ten times its weight of a mixture of ZnO and Na_2CO_3 containing three parts of ZnO to one part of Na_2CO_3. The sulfate sulfur was extracted by digesting the sample in a solution containing ten times its weight of sodium carbonate and three pellets of NaOH. In each case the sulfur then in solution was precipitated as $BaSO_4$ and weighed as such.

For the tests below 500° C., sufficient iodine was placed in the absorption tubes at the beginning of the run to care for all of the SO_2 given off.



MR. GARDNER'S study is part of a general program initiated to investigate the oxidation of metallic sulfides. Its purpose is to obtain information as to what oxidation products are obtained when oxygen reacts with galena at various temperatures. Such information may prove useful in lead smelting practice.

For the mill operators, the production of high-grade lead concentrates seems highly desirable. But smelter operators must dilute them with low-grade materials, otherwise metallic lead is formed in the wind boxes during the sintering process. This causes operational difficulties.

Studies like Mr. Gardner's may furnish a clue that will improve sintering practice for high-grade lead concentrates.

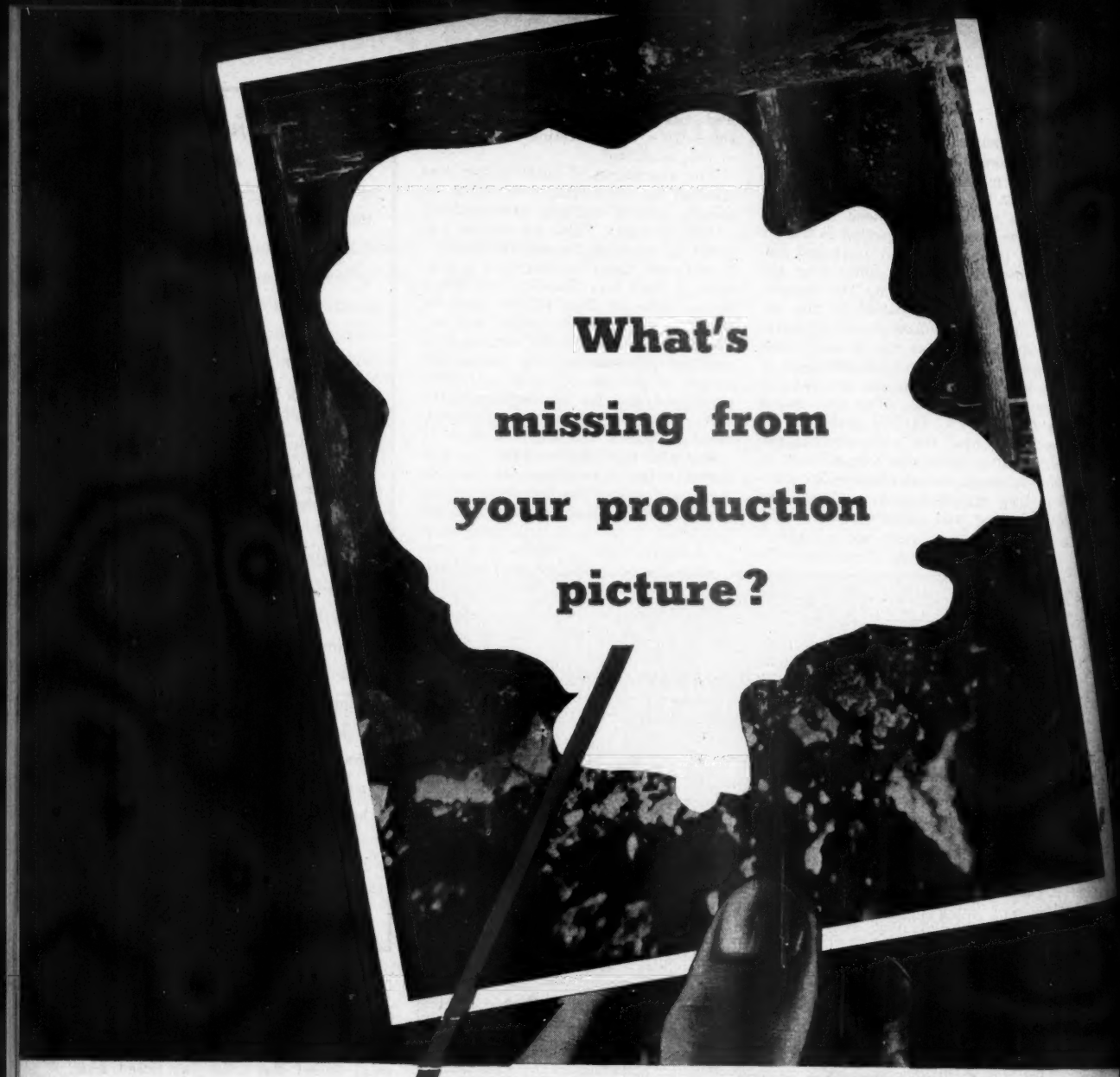
JOHN R. LEWIS, Head,
Dept. Metallurgical Engineering
University of Utah.

At temperatures of 500° C. and above, only enough iodine solution was placed in the primary absorption tubes to give a definite color. Then as the color faded the time was noted and fresh solution was added from a burette. In this way a check on the rate at which oxidation was proceeding was possible.

Experimental Results

Preliminary tests were run on the impure precipitated lead sulfide and the cleaned galena. It was determined that caustic solution was not satisfactory as an absorbing solution at higher temperatures when much SO_2 was being evolved, therefore, standard iodine solution was used for all tests on cleaned galena.

The velocity of air was not critical in the range of 1 cu. ft. per hour to 4 cu. ft. per hour when heating the precipitated sulfide to 575° C. This is shown in Table I.



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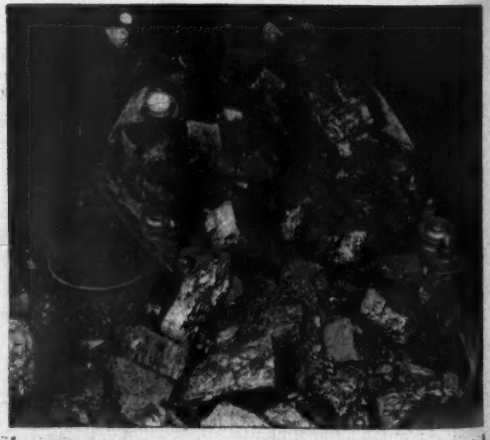
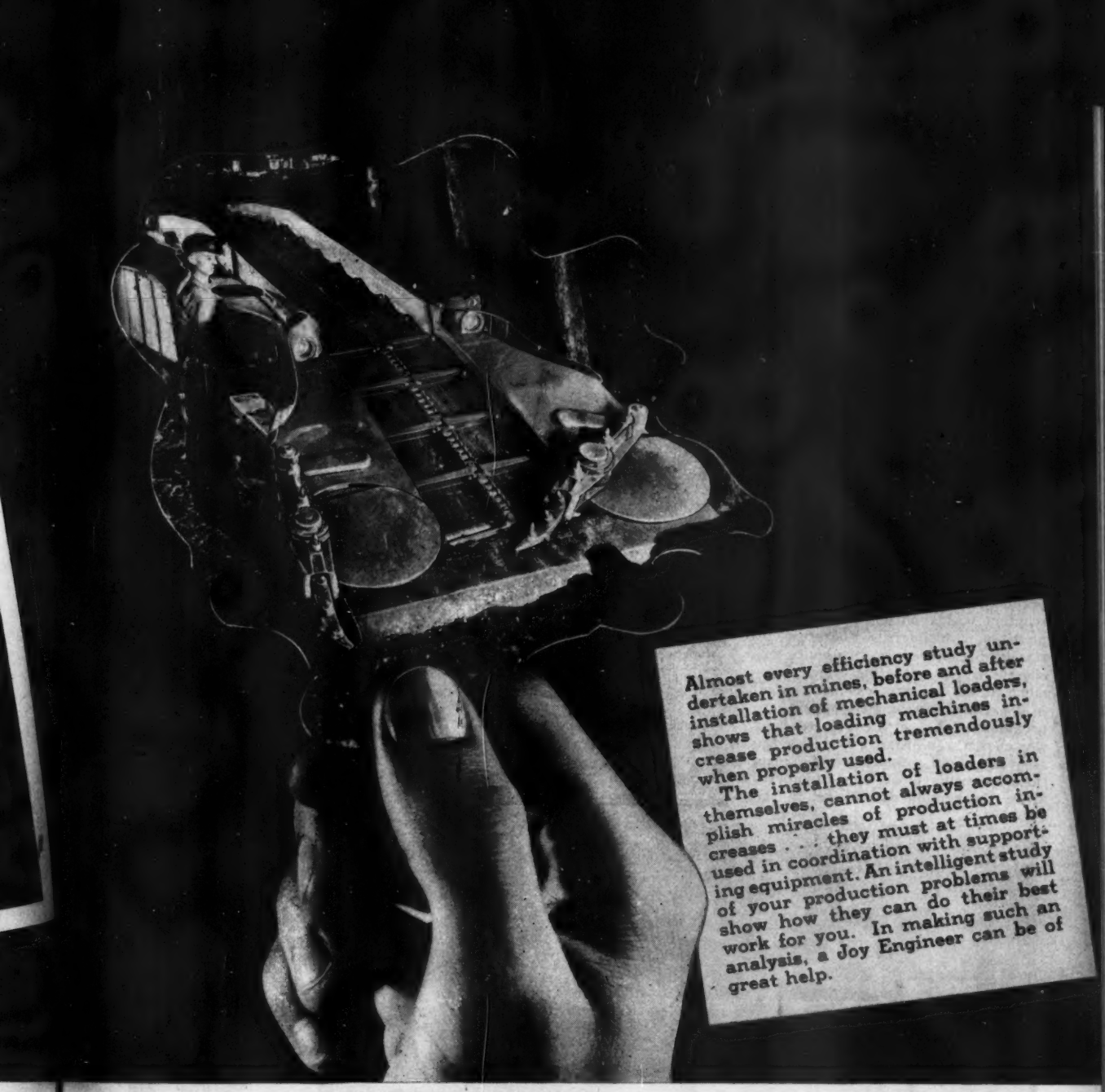


An idea of the volume of coal the Joy 11 Bu can handle at one time may be gained from this photograph.



Almost every efficiency study undertaken in mines, before and after installation of mechanical loaders, shows that loading machines increase production tremendously when properly used.

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TABLE I
Effect of Varying Velocity of Air

Velocity of air through tube	Percent of Sulfur in Residue as Sulfate Sulfur
1.16 cu. ft. hr.	74.4%
3.97 cu. ft. hr.	74.3%

Above 775° C. there was a reaction between the galena and the porcelain boat to such an extent that a balance was not attempted. However, at 800° C. a metallic lead button apparently free from any sulfate was formed surrounded by a layer of vitreous yellow lead oxide. At 1000° C. all of the lead formed was volatilized leaving only the vitreous lead oxide fused to the boat.

In the preliminary work it was found that approximately two hours were required to decompose the galena at the lower temperatures sufficiently to be able to measure the reaction products. At higher temperatures the reaction was apparently nearly complete in two hours. Therefore, to standardize procedure, two hours was chosen as the operating time. Inasmuch as air velocity was not critical in the range of 4 cu. ft. per hour, approximately that, or 5 cu. ft. per hour was chosen. In order to facilitate the recovery of all products of the reactions, particularly at higher temperatures, the sample was placed in the cold furnace, all connections secured and then the temperature raised.

Effect of Temperature

The precipitated sulfide reacted rapidly to form the sulfate at relatively low temperatures, while the cleaned galena reacted much more slowly. Two factors in the lower reaction temperature were (1) the mesh size, and (2) the presence of sulfate sulfur at the beginning of the test. The precipitated sulfide was 58 percent—200 mesh and contained 42 percent of the sulfur as sulfate. The cleaned galena was —100 +150 and contained no sulfate sulfur. Table II and Figure 2 show the effect of temperature on the sulfate sulfur formed but not decomposed under the conditions of the test.

TABLE II
Effect of Temperature on Sulfate Formation

Minus Temperature	Percent of Sulfur in Residue as Sulfate	
	Precipitated Sulfide	Cleaned Galena
275°C	56.0%	0.62%
350°C	77.3%	1.0%
425°C	92.1%	1.2%
500°C		1.4%
575°C		3.1%
650°C		7.5%
700°C		11.5%
725°C		48.0%
750°C		55.1%
775°C		55.1%

At 750° C. and 775° C. the residue in the boat consisted of a button of metallic lead and lead sulfate near the end of the boat toward the exhaust end and a layer of vitreous yellow lead oxide covering the bottom of the boat.

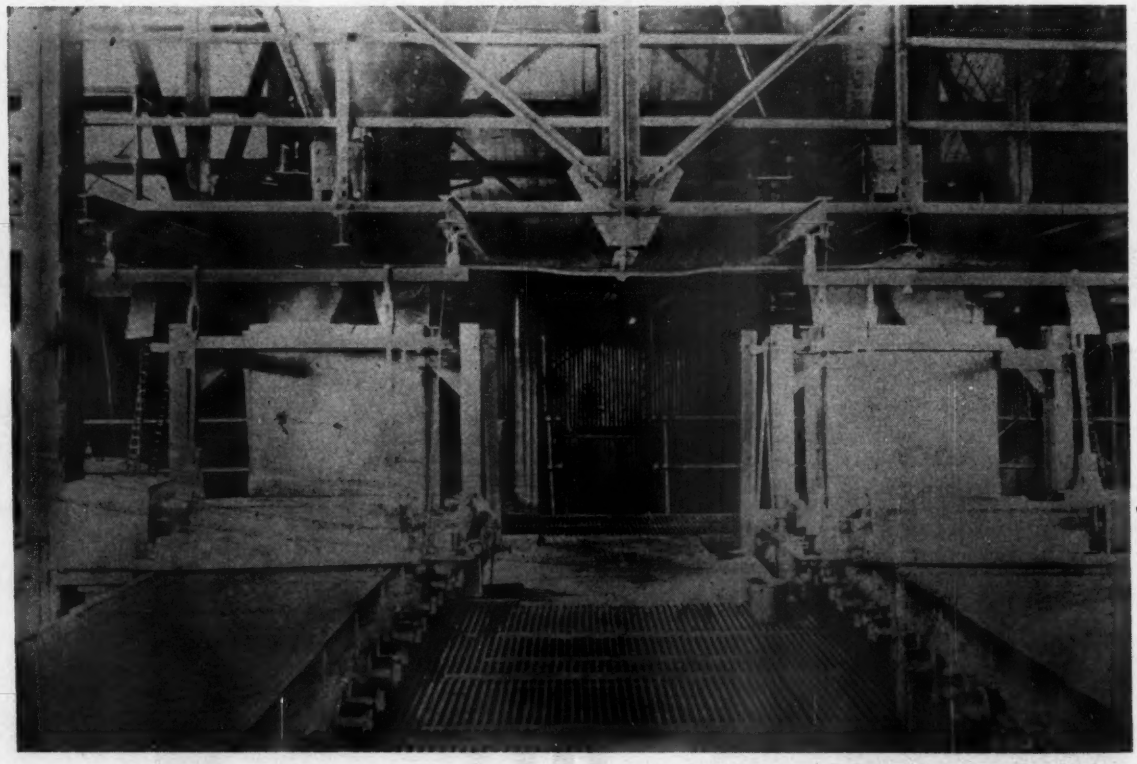
The reactions occurring during the roast probably occur in the following order:

$$PbS+2O_2=PbSO_4 \quad (1)$$
$$2PbS+3O_2=2PbO+2SO_2 \quad (2)$$
$$PbS+2PbO=3Pb+SO_2 \quad (3)$$
$$PbSO_4+PbS=2Pb+2SO_2 \quad (4)$$

Reactions (1) and (2) appear to take place at the same temperatures, the proportion going to PbO depending on the relative surface and the freedom of access of air to the particles. The SO_2 resulting from every reaction except (1) offers the most convenient method of measuring the rate of the reactions. Table III shows the effect of temperature on the relative rate of reaction as percentage of the total sulfur in the charge found as SO_2 at various time intervals. Galena was used and the time indicated is the time after reaching the temperature of the test.

Distribution of Sulphur in Reaction Products

A study of the distribution of the sulfur between the reaction products as shown in Table IV indicates that reactions (1) and (2) proceed at ap-



Dwight-Lloyd sulphide ore roaster at American Smelting and Refining Company's smelter at Murray, Utah

TABLE III

Effect of Temperature on rate of SO_2 Formation Tube Roast of Cleaned Galena

Time in Minutes	Percentage of Total Sulfur as SO_2				
	575°C	650°C	725°C	750°C	775°C
0	0.61	2.15	2.45	27.0	51.4
5	....	2.8	3.8	37.0	56.0
10	1.0	3.0	5.4	44.0	61.0
15	....	3.3	6.7	....	....
20	....	3.6	9.0	52.0	....
22	....	....	....	....	66.0
30	....	3.8	11.8	....	....
40	1.4	4.0	13.7	57.0	....
50	1.6	4.2	15.0	58.0	....
70	1.7	4.7	18.4	60.0	....
90	1.8	5.0	24.0	64.0	....
120	2.1	5.4	27.6	64.3	70.3

TABLE IV

Distribution of Total Sulfur Using Cleaned Galena

Temperature Deg. C	Percent of Total Sulfur in Residue			
	As Sulfate Sulfur	As Sulfide Sulfur	In Gas as SO_2	Percent Acc't'd.
275°	0.61	98.02	2.30	100.93
350°	1.04	96.80	1.24	99.08
425°*	1.15	96.41	3.26	100.80
500°	1.35	96.32	2.23	99.70
575°	2.94	93.11	2.13	98.18
650°	6.98	85.69	5.40	98.06
700°	10.74	82.61	11.18	104.53
725°	33.89	37.36	27.56	98.11
750°	19.43	15.86	64.38	99.62
775°	17.02	13.87	70.31	101.20

* Sample tested at 425°C. was six grams in two 6-in. boats rather than five grams in one boat as in other tests.

TABLE V

Effect of Position in Furnace Using Cleaned Galena

Test	Boat No.	Position of Boat in Tube	Sulfur in Residue		Percent of Total Sulfur Charged as Sulfate Sulfur in Residue
			Total Sulfur	Sulfate Sulfur	
I	1	a*	13.25%	0.146%	1.10%
	2	b	13.16%	0.006%	0.04%
II	1	a	12.98%	0.160%	1.24%
	2	b	12.60%	0.003%	0.02%

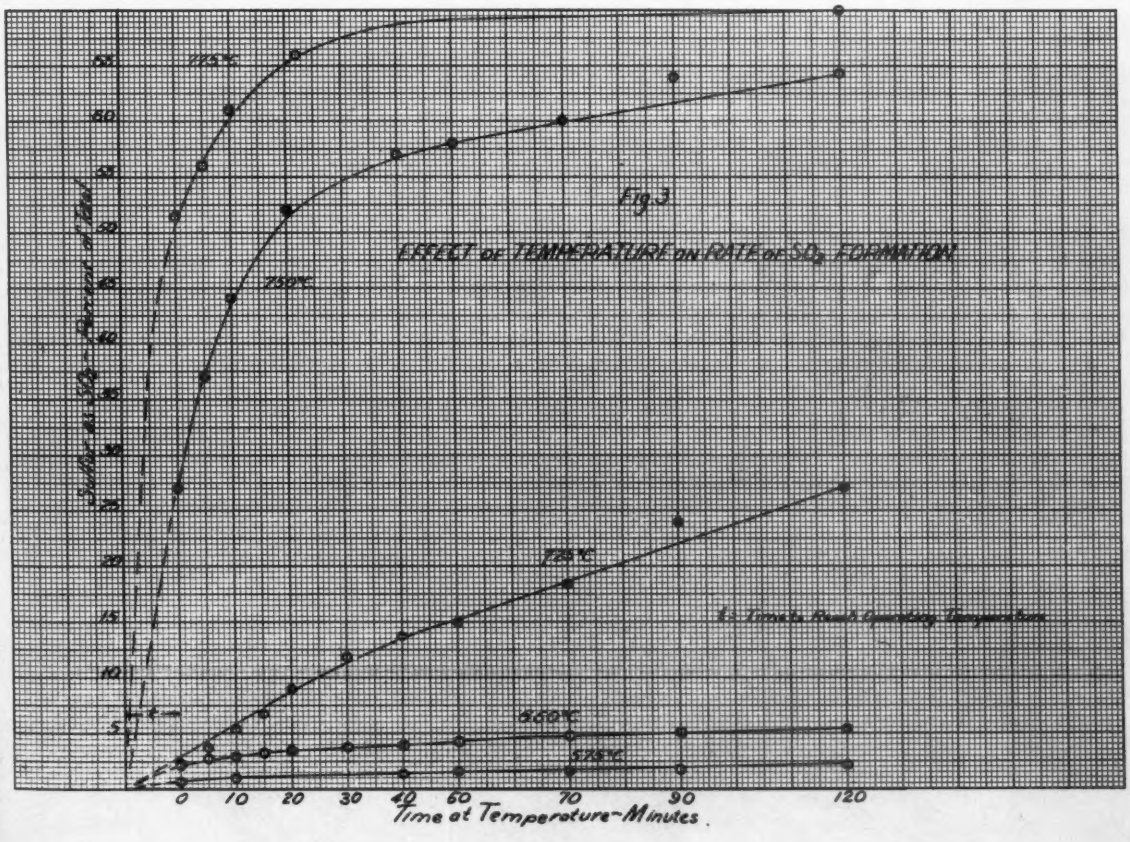
* See Figure 1.

proximately the same rate up to about 700° C. Reaction (3) possibly has a minor role in this temperature range. Reaction (4) starts at 725° C., becoming more important as the temperature increases. The data for Table IV were taken from experiments on cleaned galena.

Observations during the preliminary tests indicated that there was a definite variation from one end of the boat to the other in the physical nature of the reaction product. Therefore, two tests were carried out using two 6-in. boats, each holding three grams of galena. These were placed in line in the tube and the experiment carried out as in the other tests. Both residues were then analyzed for total and sulfate sulfur. The temperature for the run, as measured between the two boats was 425° C. The results of this test are shown in Table V.

Discussion of Results

In Table II and Figure 2 is shown the effect of temperature on sulfate formation. The precipitated sulfide



reacts very rapidly at 275° C. to the extent that after two hours at that temperature 56 percent of the sulfur in the residue is present as sulfate sulfur. The cleaned galena reacts much more slowly, only 0.6 percent decomposing to the sulfate at 275° C. after two hours. As the temperature increases the reaction rate increases rapidly for the precipitated sulfide until at 425° C., 92 percent of the sulfur in the residue is sulfate sulfur. The rate increases slowly for the galena up to 650° C., and then more rapidly up to 750° C. at which temperature the decomposition of the sulfate begins. Between 750° C. and 775° C. the decomposition of the sulfate takes place as rapidly as it is formed.

In Table III and Figure 3 is shown the effect of temperature on rate of SO_2 formation.

Sulfate Decomposition Becomes Major Factor at 750° C.

In Table IV the distribution of the sulfur between the various reaction products is shown for the galena. The relative proportions as SO_2 and as sulfate sulfur are approximately the same up to 750° C. At this temperature the decomposition of the sulfate becomes important and becomes a major factor. In this temperature range the decomposition of the sulfide slows down to the same rate as the decomposition of the sulfate. At 775° C., 17 percent of the sulfur charged in the galena is present in the residue as sulfate sulfur and 14 percent as undecomposed sulfide sulfur.

It is interesting to note that in the experiment at 425° C. where the relative surface exposed was greater than at the other temperatures, the proportion of the sulfur as SO_2 was greater than at the other temperatures in that range.

Primary Reaction Indicated

In Table V is shown the effect of position in the furnace on the sulfate formation. The sample in the boat closest to the incoming air in each case had the highest percentage of sulfate sulfur. This would indicate that formation of sulfate is a primary reaction and not a secondary reaction from the products of the original reaction. For if it were a secondary reaction involving the gaseous products of a primary reaction the concentration of sulfate should increase as the opportunity for contact with the gaseous products increased down the length of the tube.

In this respect Ashcroft* reports that in the roasting of copper sulfide the reaction proceeds primarly to sulfates with oxides resulting from a secondary reaction:

$$CuSO_4+CuS+2O=2CuO+2SO_2$$

which begins at almost as low a temperature as the beginning of the sulfate formation in a well rabbled furnace. It is believed that similarly the formation of lead sulfate is a primary reaction and not a secondary reaction.

* Ashcroft, E. A., Sulfate Roasting of Copper Ores and Economic Recovery of Electrolytic Copper from Chloride Solutions. Trans. of the Electrochemical Society Vol. 63, 1933, Montreal.

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Smelter of American Smelting and Refining Company at Murray, Utah (*Photo Courtesy of Kuno Doerr, Asst. Mgr., A. S. & R. Co.*)

Distribution of Power Costs

A Report by the Committee on Underground Power

A Compilation of Actual Mine Records Showing the Amounts of Electric Power Used for the Various Surface and Underground Operations

THE performance efficiency of an underground electrical power system cannot be determined by visual inspection but must be established by instrument readings and mathematical calculations and no other mining operation so readily lends itself to statistical analysis. Too much dependency, however, should not be placed on statistics alone; figures, if not clearly understood, can be misleading and great care must be exercised in making use of power data particularly when comparing mines, fields, or methods of operation.

For example, averages are useful as guides for general performance standards in certain fields or a given set of mining conditions but because of the many variables which affect the efficiency of the power system, averages are not conclusive. Therefore final judgment as to what constitutes good or poor results must be based on detailed records of individual operations. But, even then, the correct interpretation of individual records cannot be made without some knowledge of physical facts. It is a common experience to find in the same locality, or in the same mine, different factors that materially affect the electrical costs even where the same degree of efficiency exists in the installation and operation of the power systems. The report here submitted illustrates that situation.

This study and analysis covers the power records for a group of seven mines in southern West Virginia producing three and one-half million tons per year, under fairly similar seam and physical conditions. All have modernized their equipment and methods; A.C. power is used for tipples, hoists, fans, and main pumps; the coal is prepared over shaking and vibrating screens with mechanical cleaning for the smaller sizes. The underground operations use D.C. power and are completely mechanized with the exception of the loading, which as given in the following paragraphs, is partially mechanized with conveyors.

Data on Mines

Mine A has an average height of 3 ft. 3 in.; 80 percent of the tonnage is mined with hand loading onto conveyors; the coal is hoisted by shaft and is elevated a total of 664 ft. from the inbye sidetrack underground to the surface dump.

Mine B has an average height of 3 ft. 6 in.; 30 per cent of the tonnage is mined with hand loading onto conveyors; the coal is hoisted by slope and is elevated a total of 565 ft. from the inbye sidetrack underground to the surface dump.

Mine C has an average height of 3 ft. 6 in.; 30 per cent of the tonnage is mined with hand loading onto conveyors; the coal is hoisted by slope and is elevated a total of 290 ft. from the inbye sidetrack underground to the surface dump.

Mine D has an average height of 3 ft. 9 in. and has no mechanical or conveyor loading; the coal is hoisted by shaft and is elevated a total of 623 ft. from the inbye sidetrack underground to the surface dump.

Mine E has an average height of 3 ft. 10 in.; 30 percent of the tonnage is mined with hand loading onto conveyors; the coal is hoisted by shaft and is elevated a total of 447 ft. from the inbye sidetrack underground to the surface dump.

Mine F has an average height of 3 ft. 9 in.; 80 percent of the tonnage is mined with hand loading onto conveyors; the coal is hoisted by shaft and is elevated a total of 934 ft. from the inbye sidetrack underground to the surface dump.

Mine G has an average height of 3 ft. 5 in.; 80 percent of the tonnage is mined with hand loading onto conveyors; the coal is hoisted by shaft and is elevated a total of 408 ft. from the inbye sidetrack underground to the surface dump.

TABLE 1

Distribution of Surface and Underground Power, Showing KWH Used per Ton of Coal Mined

Mine	Hoist A.C. kwh.-ton	Fan A.C. kwh.-ton	Tipple A.C. kwh.-ton	Town A.C. kwh.-ton	Pumps A.C. kwh.-ton	Total A.C. kwh.-ton	D.C. in mines kwh.-ton	Total power kwh.-ton	Tons mined
For Month of June, 1945									
A	1.73	1.48	0.62	0.30	1.21	5.34	5.31	10.65	43,203
B	0.59	0.85	0.54	0.26	...	2.24	6.66	8.90	37,320
C	0.49	0.65	0.40	0.27	...	1.81	4.60	6.41	40,865
D	1.16	1.88	0.70	0.24	2.56	6.54	4.57	11.11	53,517
E	0.93	1.11	0.43	0.44	4.78	7.69	6.11	13.80	26,846
F	1.93	1.30	0.58	0.20	1.18	5.19	6.78	11.97	40,252
G	1.42	1.19	0.79	0.34	2.16	5.90	4.56	10.46	44,036
For Month of July, 1945									
A	1.90	1.72	0.70	0.57	1.61	6.30	6.18	12.48	34,645
B	0.59	0.99	0.57	0.32	...	2.47	7.56	10.03	29,552
C	0.52	0.81	0.45	0.34	...	2.12	5.17	7.29	32,782
D	1.26	2.30	0.75	0.29	3.22	7.82	6.12	13.94	41,095
E	1.00	1.33	0.48	0.60	5.68	9.09	7.02	16.11	21,441
F	2.01	1.60	0.58	0.55	1.47	6.21	7.41	13.62	31,631
G	1.53	1.50	0.87	0.45	2.45	6.80	5.00	11.80	33,775
Averages for Year 1944									
A,B,C	0.933	0.973	0.575	0.36	1.63	4.47	5.31	9.78	1,506,000
D,E,F,G	1.33	1.71	0.78	0.49	2.62	6.93	5.57	12.50	1,976,000

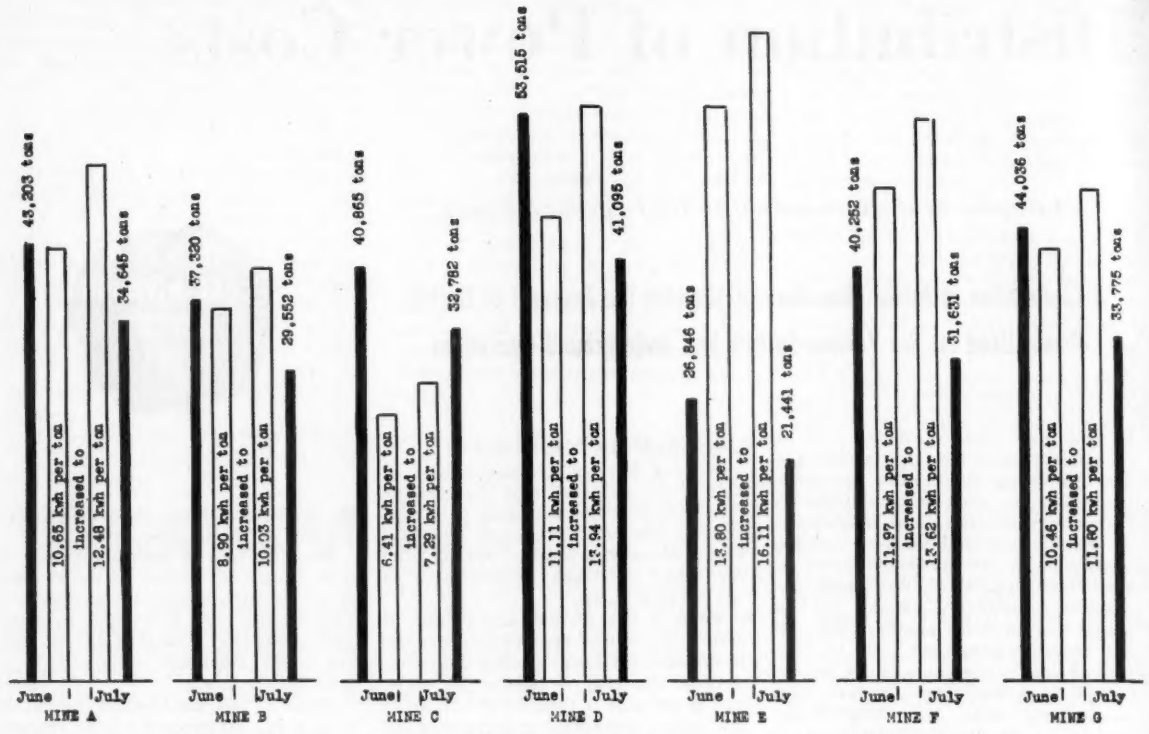

Fig. 1. Chart of tons mined and power used in June and July, 1945, showing how power per ton increased when coal production declined

Analysis of Power Costs

Table 1 shows the amounts of power used for the various surface and underground operations at these mines, expressed in kwh. per ton. Merely as a matter of interest, this table gives two group averages for the year 1944 but the real story is in the individual mine records. The months of June and July, 1945, were selected as being representative of high and low tonnage; June had a normal high production while in July, due perhaps to holidays and vacations, the tonnage for the entire group dropped over 20 percent—from 286,000 to 225,000 tons.

Examination of the figures discloses marked differences in the amounts of power used for the various operating items, but one fact immediately apparent is the difference between two months' figures—that is, the greater kwh. per ton consumed in July. This can be directly accounted for by the tonnage loss in July and it will be noted that the lower production for this month as compared to June is reflected by the increased power used in every operation by all of the mines. This is graphically shown in Figure 1 and needs no further discussion.

However, when we go beyond this and try to explain the reasons for the differences between the mines in the kwh. per ton for the various items, we are faced by a lack of knowledge of operating details and further anal-

TABLE 2

Power Used With Different Mining Methods and Hoisting Elevation

Mine	Method of Loading	D.C. in mines kwh.-ton	Height coal is elevated	Hoist A.C. kwh.-ton	Mining-hoisting kwh.-ton
A	80 percent conveyors	5.31	664 ft.	1.73	7.04
B	30 percent conveyors	6.66	565 ft.	0.59	7.25
C	30 percent conveyors	4.60	290 ft.	0.49	5.09
D	All hand	4.57	623 ft.	1.16	5.73
E	30 percent conveyors	6.11	447 ft.	0.93	7.04
F	80 percent conveyors	6.78	934 ft.	1.93	8.71
G	80 percent conveyors	4.56	408 ft.	1.42	5.98

TABLE 3

Pumping and Power Data for Year 1944

Pumping Station	Head in ft.	Average G.P.M. pumped	Gallons pumped during year	Kwh. for pumping during year	Average gallons per kwh.
No. 1.....	271	2,844	1,500,773,300	1,801,000	833.3
No. 2.....	455	585	309,504,760	648,300	476.2
No. 3.....	220	416	219,542,412	224,183	979.3
No. 4.....	393	1,740	920,241,935	1,668,919	551.4
No. 5.....	618	601	316,398,696	903,480	350.2
No. 6.....	470	263	138,093,880	300,400	459.7
No. 7.....	515	178	3,756,512	224,137	418.3
No. 8.....	540	519	273,258,819	680,934	401.3
No. 9.....	455	183	96,357,250	203,500	473.5
No. 10.....	503	78	41,249,962	95,752	430.8
No. 11.....	350	267	140,559,227	227,038	619.1
No. 12.....	381	104	55,024,850	97,303	565.5
No. 13.....	685	61	31,883,040	100,800	316.3
No. 14.....	590	121	63,152,210	172,925	365.2
No. 15.....	583	363	191,687,366	518,775	369.5
All Mines	average 468.6	average 8,323	total 4,391,484,219	total 7,867,446	average 558.0

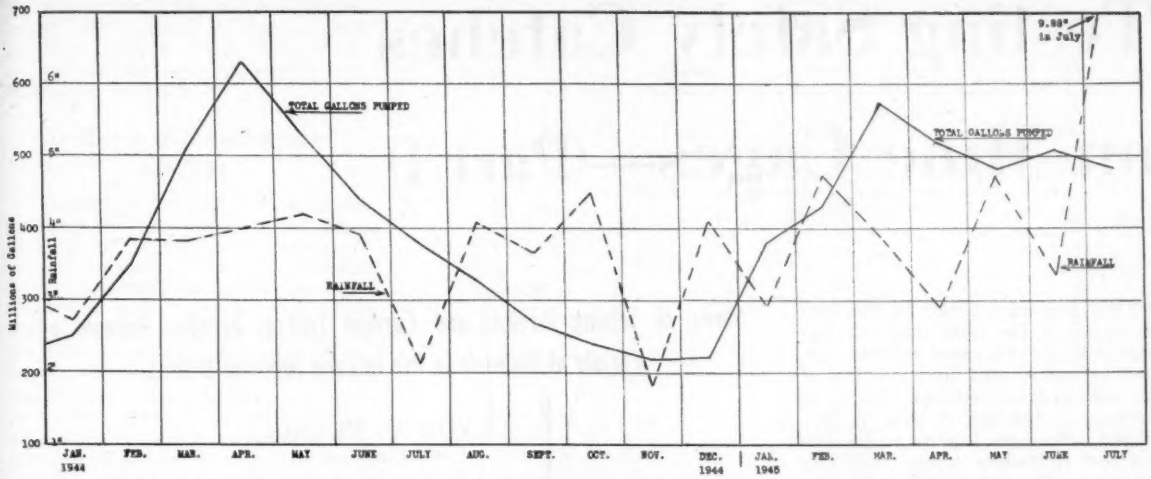

Fig. 2. Chart showing monthly rainfall and gallons of water pumped from Mines A to G from January, 1944, through July, 1945

ysis of these figures should not be attempted. This is illustrated in Table 2. It is well known that mechanical loading has a direct effect on power use, yet Mine G with 80 percent conveyors, Mine C with 30 percent conveyors and Mine D with hand loading into mine cars all consume approximately the same amount of D.C. power underground. Mine F with the highest lift of 934 ft. uses the most A.C. power for hoisting and Mine C with the smallest lift uses the least, but aside from these two extremes, the hoisting kwh. and lifts in the rest of the mines do not have a constant relation to each other. That means that there are other factors present; one is that the hoisting heights given in the table are composed not only of the vertical depths of the shafts or slopes but include also some main haulage grades in the mine where D.C. power is used. It would require a full and detailed list of all variables of course to explain all discrepancies found.

Pumping

Table 3 gives the complete pumping and power data for the year 1944 for 15 pump installations in various mines of this group but contains the records for only the A.C. installations pumping to the surface and does not include the D.C. gathering pumps underground. The annual production of the mines where the pumping is done is approximately three and one-half million tons and for this group as a whole the annual pumping in 1944 averaged 1,260 gallons, or five tons of water per ton of coal mined. However the peak loads are greatly in excess of the averages as is indicated on Figure 2. And in April, 1944, which is the maximum pumping month in this period, stations 1, 2 and 3 handled almost two and one-half times the average amount and pumped about 12 tons of water for each ton of coal mined. This of course is not high as far as some other fields are concerned, particularly in anthracite mining, but it is nevertheless quite a heavy burden and calls for modern and efficient pump installations and operation. The figures given for the head in column 2 include both the vertical lift and the pipe friction.

Figure 2 shows the record for this group of mines for total gallons pumped and rainfall during the 18-month period—from January, 1944, through July, 1945. This is self explanatory, but it is nevertheless worth calling attention to the surprising lack of conformity between the pumping and the rainfall curves. However, a partial explanation is that the underground water, before coming into the mine, passes through an immense reservoir, formed by the heavy overburden. This acts as a sort of giant sponge and is only slightly affected by the surface rainfall. Again, the heavy rainfall in the summer is largely disposed of by the rapid runoff which occurs in mountain areas. In any event it will be noted that the record rains of July, 1945, had no immediate effect on the July pumping, although this may yet show up in later months of the year.

Figure 3, showing the relation between the gallons pumped per kwh. at various pumping heads, is submitted as evidencing a fairly uniform pumping efficiency in the mines of this group. It should be noted, however, that while the kwh. per gallon increases with the head, the actual kwh. per ton for pumping (Table 1) was affected more by the tonnage mined than by the amount of water handled. This further emphasizes the importance of production as a power cost factor.

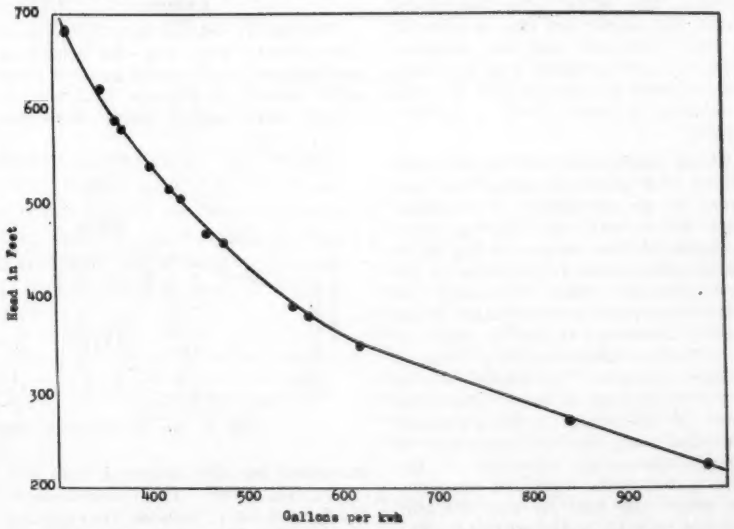

Fig. 3. Curve showing gallons of water pumped per kwh. at various heads during year 1944

Testing Safety Catches on Mine Cages—(Part I)

Study of Testing Devices and Current Testing Practice Reveals a Variety of Methods in Use in Lake Superior District

By CLYDE M. PEARCE
Mining Engineer
and
FRANK E. CASH
Supervising Engineer
Health and Safety Branch, U. S. Bureau of Mines, Duluth, Minn.

THE general practice in the iron mines of the Lake Superior district is to provide cages wherein men may be transported into and out of the underground workings. Riding in skips or on the bail of skips is prohibited. Men use ladders to go into and out of shallow mines, including one mine where the shaft is 315 ft. deep from the collar to the floor of the station. Single- and double-deck enclosed cages varying in capacity from 12 to 90 men (with the two decks loaded) are used for handling both men and supplies. Doors or gates are provided, and the safety rules specify that these be kept closed when men are being transported. The cages are equipped with safety catches. The shaft area is small in some mines, and the cages and skips are hung in tandem, the skips being suspended under the cages; but this is unusual, as two skipways and one cageway generally are provided. The two skips are operated in balance, and the cage is usually in balance with a counterweight.

Types and sizes of hoists vary widely with depth of shafts and tonnages of ore produced. The single-drum hoist, with the hoisting ropes anchored at the flanges of the drum and spooling toward the center, is the most common type. Virtually all hoists are operated electrically. Some type of automatic control is provided on all cage hoists, varying from a simple controller that shuts off the power if the cage is raised above the collar of the shaft to the elaborate controller that warns the operator if normal speeds are exceeded or the hoist is not being retarded properly, and stops the hoist if the operator does not respond to the warning. The controller will also stop the hoist in case of power failure or if the cage is moved beyond the fixed stopping point; and in the event of overwind, it will prevent the operator from starting the hoist before he reverses the direction of its travel.

The data on safety catches in this report were gathered during routine inspection work and are not all inclusive as to the types used in this region but they show the general practice in the Lake Superior district.

Safety Catches are of Several Types

The safety catches inspected are of the general type, and the actuating mechanisms work on the general principle, shown in Figures 1, 2, and 3, which were copied from drawings furnished by the National Iron Co. of Duluth, Minn. The dimensions in the figures vary, because drawings of three different cages were used to show the desired details. Four cast-steel cams, with steel pins inserted in the faces, are mounted on the ends of two substantial jackshafts that extend across the top of the cage. The cams are placed in pairs, the pairs being arranged to engage both sides of the cage guides when in the closed position and to clear the guides when open. In the design shown, the coiled springs, which close the catches by rotating them to contact the wooden cage guides, are mounted on the jackshafts. In other designs, the springs are mounted in a vertical position on the top of the cage and rotate the cams through levers attached to the jackshafts.

Some safety catches have been designed that have the teeth cast as an integral part of the cam. However, in all the tests witnessed and herein described, cams with steel pins inserted in the face were used.

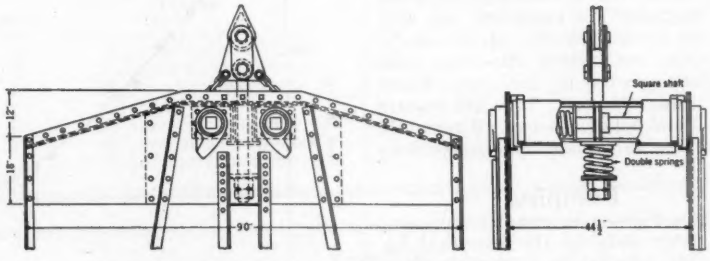

Fig. 1. Top of man-cage showing safety catches and springs

The efficiency of the various designs is not pertinent as the action of the cams was similar in all the tests. The cam-shaped safety catches are held open and clear of the wooden cage guides by the tension on the hoisting rope. If this tension is released through the cage being set on some firm support or through the failure of the hoisting rope, the coiled springs rotate the jackshafts, turning the cams toward the timber guides until contact is made and cams firmly grip the timber. Any further downward movement of the cage causes the cams to grip the timber guides more firmly, until they are forced into the timber and almost invariably stop

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the cage. The safety catches are released and returned to their normal operating position, when tension is reapplied to the rope by raising the cage with the hoist.

Methods of Testing are Similar

The general method of testing the safety catches is the same at all mines investigated. Periodic inspections vary from cleaning the catch mechanisms once a month to a thorough daily inspection with the cage resting on chairs, and the testing of the action of the catch-actuating mechanism by releasing and reapplying the tension on the hoisting rope. A drop test, with a written report of the results achieved, is made every month. Methods of testing vary, but in every test the cage is suspended from some device attached to its drawbar, and, when the suspending device is released, the freed cage is allowed to drop until it is stopped and held by the safety catches.

Most of the tests are made with an empty cage. Many of the mine officials said tests show that the reaction of the safety catches is the same when the cage is empty as when it carries a dead load; therefore, the empty cage is used for convenience.

It is worthy of note that in 7 of the 13 tests observed, the safety catches were not disturbed before the test was made. In the other six instances, the cage was lowered onto rests, and the tension on the hoisting rope was released during the process of installing the testing device. At one mine, the only inspection is made during the monthly drop test, when the cage is rested on timbers at the collar of the shaft both before and after the test to facilitate cleaning and oiling of the safety-catch mechanism. As it is the usual practice to release the tension on the hoisting rope by pulling slack in it and forming a loop around the tripping device rather than by disconnecting it from the cage, this method is referred to as the "slack-rope drop test" in this report.

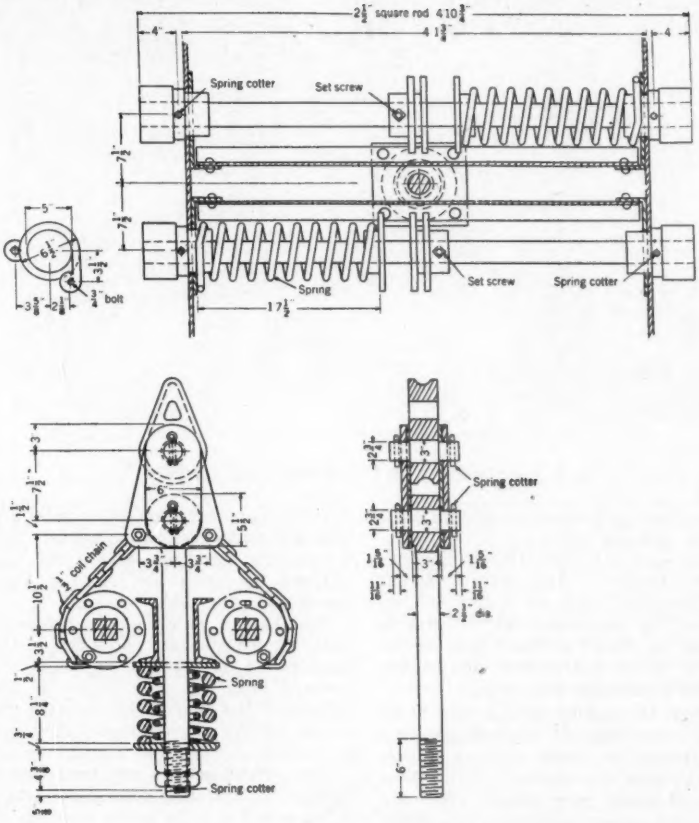


Fig. 2. Cage hanger and safety-catch assembly

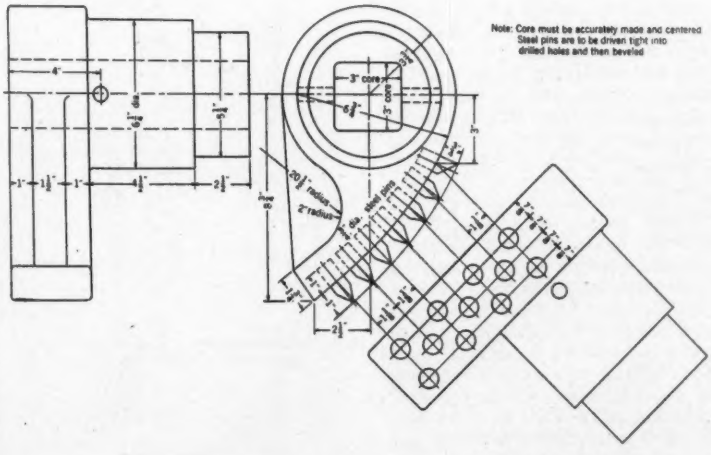

Note: Core must be accurately made and centered
Steel pins are to be driven tight into drilled holes and then beveled
steel pins

Fig. 3. Cast-steel cams for safety catches

Another interesting practice is the provision of short, easily replaceable sections in the wooden cage guides at the point where the cams engage in testing. The tests are conducted just above the collar of the shaft, and blocking is placed across the collar to prevent the cage from dropping down the shaft should the catches fail. There have been occasional failures, but these were due to improper maintenance, such as allowing ice or other foreign material to accumulate in the actuating mechanism.

Examples of Tests of Safety Catches

Mine A — Two Steel Rope Slings Employed in Slack Rope Drop Test

Mine A has a daily production of approximately 2,200 long tons of iron ore, which is hoisted from a depth of 3,600 ft. in two 9-ton-capacity skips operated in balance. One double-deck cage, balanced with a counterweight, is provided for the transportation of the 218 underground employes and mine supplies. Both the skip and the cage hoists are equipped with Lilly

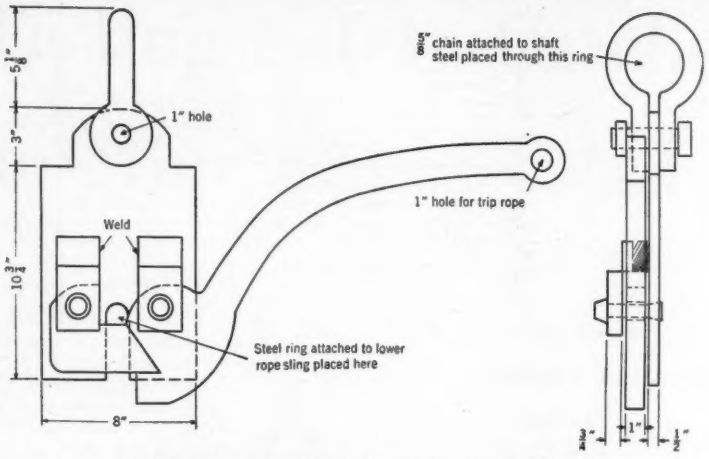


Fig. 4. Tripping device for testing safety catches—Mine A

controllers as protection against overspeed and overwind.

The cage is equipped with cam-type safety catches. The safety catches are inspected daily by noting the action of the mechanism as the cage is placed on chairs at the collar of the shaft. They are tested each month by the slack-rope drop test.

When the safety catches are to be tested, the cage is hoisted into the headframe, the shaft opening is covered by steel fire doors, and two 6-in. steel H-beams are placed over the doors for greater strength. Two steel-rope slings are fastened to the hoisting rope, one about 4 ft. and the other about 20 ft. above the cage. A ⅝-in. steel cable with ¾-in. block and tackle attached is fastened to the upper sling to pull slack in the hoisting rope. A steel ring is provided on the lower sling for attaching the lower end of the tripping device, which is illustrated in Figure 4. The upper end of the device is fastened to a ⅝-in. steel chain, which is attached to and supported by members of the steel headframe. When the tripping device is in place, the cage is lowered until its weight is supported by the tripping device. About 1½ ft. of slack is then pulled in the hoisting rope, the tripping device is sprung, and the freed cage drops until the safety catches function. If the cage drops more than 3 in., the safety catches are adjusted, and the test is repeated until the drop is 3 in. or less.

Mine B || Mechanic Rides Bonnets Daily; Slack Rope Clamps 30 Ft. Apart

Mine B has three shafts ranging in depth from 2,700 to 3,200 ft.; one is vertical, and the other two are inclined about 67 degrees. The output of 4,600 long tons of iron ore produced each day is hoisted in skips in the vertical shaft. All three shafts are equipped with cages, which are used for the transportation of supplies and the 470 underground employes. The hoists are equipped with Lilly controllers for protection against overspeed and overwind.

The safety catches are inspected daily by a mechanic, who rides on the bonnets of the cages as they are lowered onto the cage chairs at the collars of the shafts and watches the action of the mechanisms. Any imperfection is corrected without delay.

The safety catches are tested each month by the slack-rope drop tests. When a test is to be made, the cage is hoisted above the collar of the shaft, two tiers of four 3- by 12-in. planks are placed across the shaft, one on each side, and the cage is lowered onto these planks. Two clamps that support the testing device, illustrated in Figure 5, are attached to the hoisting rope, one just above and the other about 30 ft. above the cage; slack is pulled by means of a hand line attached to the upper clamp; and the lower chain of the testing device is attached to the tripping device, which is suspended from the upper clamp, forming a loop in the hoisting rope. The cage is then suspended from the testing device by hoisting it 1 to 4 ft. above the blocking across the collar of the shaft. When the arrangements have been completed, the tripping device is sprung, and the freed cage drops until it is stopped by the safety catches. If the drop exceeds 3½ in., the safety catches are checked and put in proper working order. The cage is spotted for each test so that the cams of the safety catches will engage undamaged places on the removable sections of the wooden cage guides.

Mine C || Testing Device Suspended in Headframe

The three-compartment shaft, 1,900 ft. deep, inclined at 78 degrees, limits the productive capacity of mine C. Two compartments are used for hoisting the 800 long tons of iron ore produced each day and for transporting the 280 underground employes and the mine supplies. The skips are suspended under the cages, and the skip-cage units are operated in balance. The hoist is equipped with a Lilly controller for protection against overspeed and overwind, which is quickly and easily adjusted to permit high speed for hoisting ore and low speed for hoisting men.

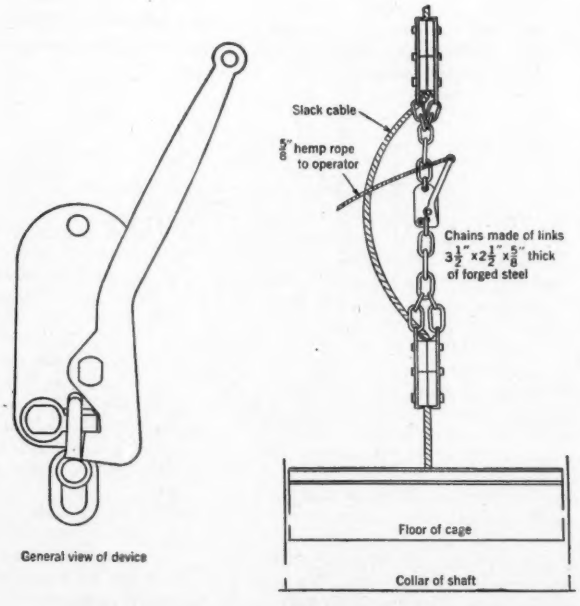


Fig. 5. General arrangement of device for testing safety catches—Mine B

The safety catches are inspected three times each week and are tested by the slack-rope drop-test method once each month. When the test is to be made, the skip-cage unit is hoisted into the head frame, and two 12- by 12-in. timbers are placed across the shaft at the collar. A testing device is then suspended in the head frame and fastened to the hoisting-rope thimble at the top of the cage. The unit is then lowered until it is supported by the testing device, and enough slack is obtained to insure that it will drop to the 12- by 12-in. timbers if the safety catches fail. The testing device is then sprung, and the unit, freed of support, drops until it is stopped by the safety catches. If the drop is more than 4 in., the safety-catch mechanism is examined and put in proper working order.

Mine D — Tripping Device Permanently Attached to Hoisting Rope

Mine D is operated by open-pit mining methods except for the final transportation of the ore and employes. The ore is transported from the open pit to the shaft pocket by means of a series of belt conveyors and is then hoisted to the surface through the shaft. The four-compartment, 300-ft.-deep shaft is equipped with two skips for hoisting ore and a cage for the transportation of men and supplies. The output of about 6,000 long tons of iron ore is hoisted daily by operating the skips 16 hours a day.

The safety catches are tested monthly by the slack-rope drop-test method. When the drop test is to be made, the cage is hoisted into the head frame, and two 40-lb. rails are placed across the shaft at the collar. The cage is lowered onto the rails, and enough slack is pulled in the hoisting rope to permit connecting the tripping device, which is permanently attached to the hoisting rope. When the testing device is in place (Fig. 6), the cage is hoisted until it is suspended from the device, about 3 ft. above the rails; the device is sprung, and the cage, freed of support, drops until it is stopped by the safety catches. If the drop is 3 in. or less, the safety catches are considered to be working properly.

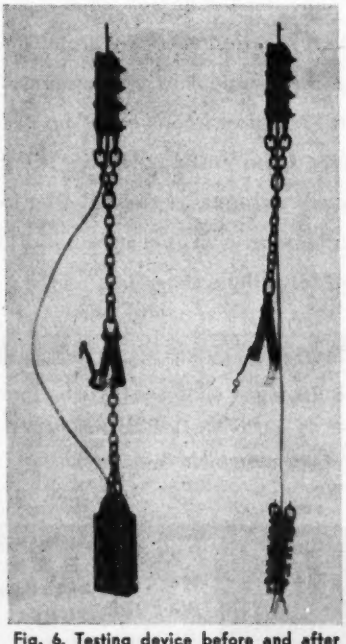


Fig. 6. Testing device before and after tripping—Mine D

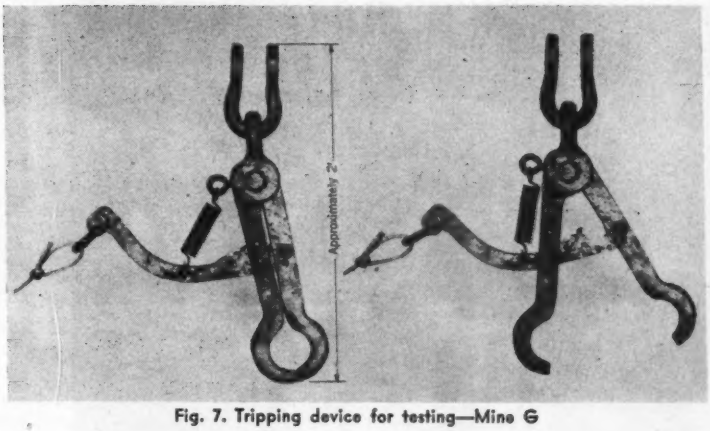


Fig. 7. Tripping device for testing—Mine G

Mine E — Cage Operated as an Elevator; Controls Can be Switched to Hoistman; 15-Ft. Loop Used in Testing

The 348-ft. deep shaft at mine E is equipped with two skips and a cage. Daily production is about 1,000 long tons of iron ore, and 80 men are employed underground. The cage is unique in the Lake Superior district, as it is normally operated as an elevator by the skip rider. It can be operated in the usual manner by switching the control to the hoistman. Interlocking switches prevent simultaneous operation of the two controls.

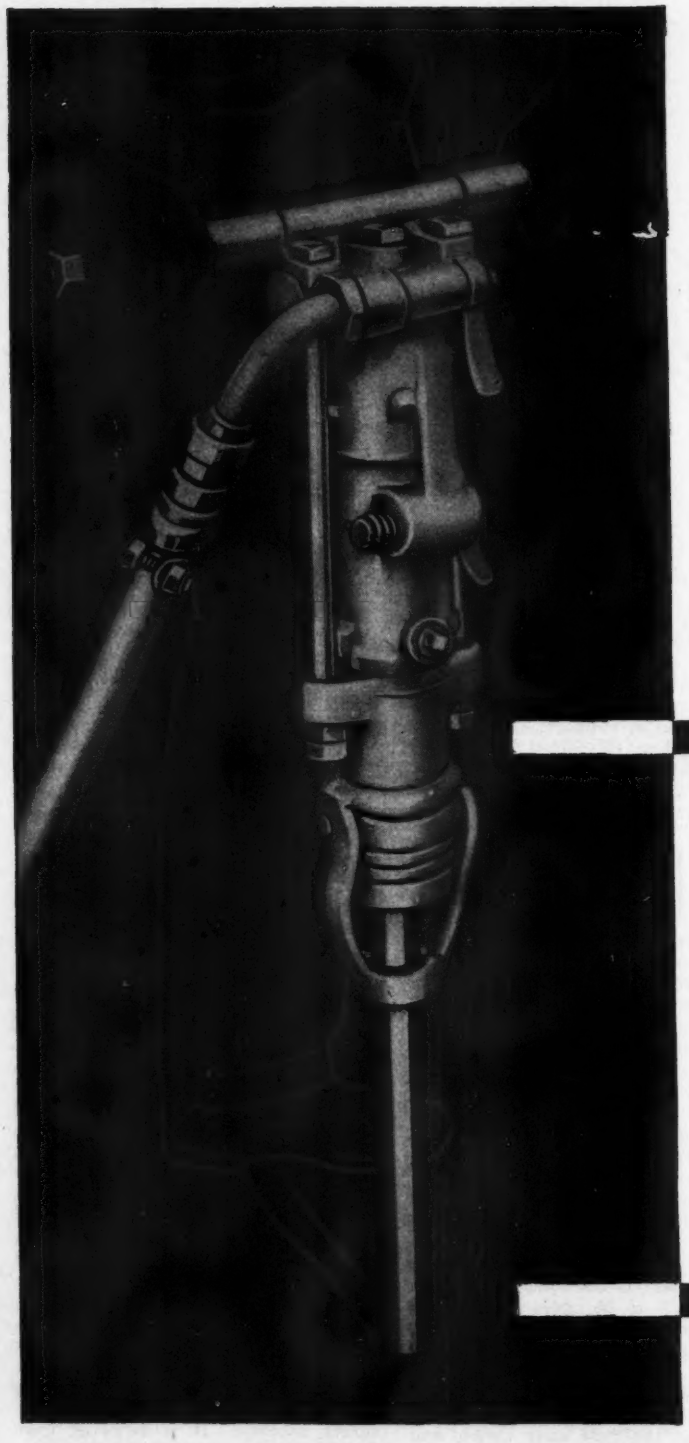
The method of making the monthly drop test of the safety catches is similar to that used in other mines in the district, but the place where the test is made is unusual. When the drop test is to be made, the cage is hoisted into the head frame, a 12- by 12-in. timber is placed across the shaft at the collar, and the cage is lowered onto the timber. Boards are laid on the ground between the hoist house and the first idler stand, and enough slack is pulled in the hoisting rope to cause it to lie on the boards. Two steel plates with Crosby clips are fastened to the hoisting rope where it is lying on the boards, and the testing device is attached to these plates so that a 15-ft. loop is formed in the rope. The hoist is then started, and the cage, supported by the testing device, is raised about 10 ft. above the 12- by 12-in. timber. The testing device is sprung by means of a trigger and rope, and the cage, freed of support, drops until the safety catches function. The cage dropped less than 5 in. at the time the test was observed. The testing device was disconnected, splinters of wood were removed from the cams, and the cage was returned to its normal operation.

Mine F — Hemp Rope Severed with Axe to Release Cage in Testing

The four-compartment, 345-ft. deep shaft at mine F is equipped with two skips that operate in balance and a service cage that is used for the transportation of men and supplies. The hoists are equipped with Lilly controllers. The safety catches are tested once each month by the slack-rope, drop-test method.

When the drop test is to be made, the cage is hoisted into the head frame, and heavy timbers are placed across the shaft at the collar. The cage is lowered onto these timbers, slack is pulled, and a loop is formed in the hoisting rope by fastening a piece of hemp rope to the drawbar of the cage above the safety catches and to the hoisting rope above the looped section. The cage is then hoisted a short distance above the timbers to suspend it on the hemp rope and complete preparations for the test. The hemp rope is then severed with an ax, and the freed cage drops until it is stopped by the functioning of the safety catches. It is reported that the catches have always stopped the cage and that the drop is 2 to 3 in.

Part II of this article covers additional safety-catches and their testing and presents conclusions relative to their success in preventing accidents.—In the October MINING CONGRESS JOURNAL.



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Washington Highlights

CONGRESS: Reconvenes September 5.

TAXES: Ways and Means Committee consideration due in late September.

DEPLETION: Morgenthau takes parting shot.

MANPOWER: All controls lifted.

WAGES: Employers may make voluntary increases.

PRIORITIES: Rapidly disappearing.

PRICES: OWMR Director Snyder on guard.

COAL: Supply apparently sufficient.

THE sooner-than-expected surrender of the Japanese has precipitated a number of decisions in high Government circles. With the actual hostilities of war a matter of the past, Congress has been recalled from its summer recess and will meet September 5 instead of October 8. Wartime controls are being dropped daily. The Administration program calls for increased unemployment compensation, an increase in the minimum wage under the Fair Labor Standards Act, a tax program to stimulate production and maintain markets, appropriations for the planning and execution of public works, and adequate appropriation for the U. S. Employment Service.

The President is moving carefully but firmly toward simplification in organization and in the work of the Executive departments and Federal agencies. His purpose is to place immediate control of all functions at the Cabinet level so that the members of his Cabinet may cooperate toward the removal of duplication of work and bring about the much-needed economies sought in the operation of the Government.

Tax Revision

First consideration of both the House Committee on Ways and Means and the Senate Committee on Finance, now meeting in advance of the reconvening of Congress, is directed to unemployment compensation aid to the States. Because of a wide divergence of opinion concerning the extent of the aid to be granted, the preparation and passage of a bill is expected to require several weeks. It is the general opinion, however, that the latter part of September will see the Ways and Means Committee working on a revenue bill to ease individual and corporate taxes.

As a parting shot when he stepped out as Secretary of the Treasury, Mr. Morgenthau included a criticism of depletion in his Summary Report, calling attention to his repeated efforts to remove "the overly generous depletion allowances "a loophole which mineral properties." He termed the depletion allowances "a loophole which I have repeatedly recommended be closed, but which still remains in the law." The Secretary also inveighed against what he termed the special income tax benefits conferred upon residents of community-property States and called upon Congress to devote its attention to "these loopholes" in its post-war revision of the tax system.

It apparently has been a matter of much concern to the former Secretary that his repeated attacks on depletion, the first of which was made in the fall of 1933, have met with no response from the Congress other than for that body to consistently reaffirm its approval of the depletion provisions. In recent years the Congress has not infrequently taken steps to correct some of the Treasury's administrative actions in connection with the depletion provisions.

Manpower

A free labor market was officially restored immediately following the President's announcement of the Japanese surrender on the evening of August 14. Manpower controls applying to the 48-hour week, employment ceilings, priority referrals, industry and area controls were wiped out by the War Manpower Commission. For the present the network of WMC's field offices will function largely through the U. S. Employment Service (soon to be restored to the Department of Labor) to relocate workmen and returning veterans, of which from 5 to 5½ million are to be returned to civilian life in from 12 to 18 months.

Wages

Wage stabilization controls were modified by the President by the issuance of Executive Order No. 9599 on August 18. The new order succeeds Executive Order No. 9250 of October 2, 1942, now abolished. Employers may now through collective bargaining, or by voluntary action, make wage or salary increases without the necessity of obtaining approval of the War Labor Board. It is provided, however, that such increases may not be used as the basis for seeking an increase in price ceilings or to prevent justifiable price reductions. WLB is authorized to approve increases necessary to prevent "maladjustments or inequities" which would obstruct the changeover to peacetime operations. Both WLB and the Treasury, through its Salary Stabilization Unit, have implemented the new Executive order.

A Government - management - labor conference is in the offing to work out a new agreement to minimize labor disputes and resultant production losses during the reconversion period. The Chief Executive desires that the "no-strike" pledge of wartime be renewed. Secretary of Labor Schwellenbach is taking a leading part in this movement and it is anticipated that the Department of Labor will function actively in industrial relations matters in the future.

Priorities

War Production Board controls are fast disappearing. The priorities system has been abandoned and the Controlled Materials Plan ends September 30. Under the system of controls as now established three ratings are included: (1) AAA, for emergencies; (2) MM, assigned by the

Army, Navy and other military agencies; and (3) CC, only use of which will be to break bottlenecks on reconversion production or construction.

Order L-269, the scheduling order for the manufacturers of mining machinery and equipment, remains but the widely known P-56, applying to maintenance, repair, and operating supplies for mines, is set to terminate September 30; likewise assignment of preference ratings for capital equipment has been stopped, and mineral producers may now turn to their usual suppliers to meet their needs.

Prices

Director Snyder, of the Office of War Mobilization and Reconversion, has made the statement that price and wage controls are to serve as a barrier against inflation, particularly in the case of materials and products that remain in short supply. Consequently the end of the war has brought only limited changes in the field of price regulation. It has been announced by OPA that price controls are to be suspended immediately on mercury, primary aluminum, ingot and pig aluminum, magnesium scrap, primary and secondary magnesium, magnesium castings and die castings, and most aluminum castings. Administrator Chester Bowles has reached no decision on other basic materials, but there are indications that maximum price regulations may soon be a thing of the past for copper, pig iron, some steel products, and petroleum.

A "general rescue" order is in prospect under which manufacturers who suffer an over-all loss in production at normal volume may secure price increases sufficient to place them in a "break-even" position. The announced purpose is to avoid hardship to employes of companies which may encounter difficulties caused by unusual cost and price situations.

While a moderate increase in bituminous coal prices, ranging from 3 to 20 cents per ton and averaging 3.47 cents for 13 of the nation's 22 districts, became effective August 3, producers generally feel that the grants are insufficient. Severe losses are being sustained in some coal-mining areas suffering from shortage of manpower and excessive absenteeism. In such cases the resultant low production is accompanied by cost increases which make solvent operation impossible.

Travel Time

Some weeks ago the National War Labor Board directed the Utah Copper Company, at Bingham Canyon, Utah, to pay workmen for travel time spent while working in the large open-pit mine. Left to the determination of the company and the union involved were the amounts, method of determining, and designated points for going on or off duty. This case is parallel to a previous decision involving a large copper property at Santa Rita, N. Mex., and there have been similar decisions in lumber operations, as well as in WLB's approval of the Bituminous Coal contract covering travel time payments to workmen in stripping operations.

Coal Supply

Solid Fuels Administrator Ickes has announced that this country can now send 8 million tons of coal to Europe this year instead of 6 million tons as previously discussed. The Solid Fuels Requirements Committee has estimated a national need of from 570 to 585 million tons of bituminous coal in the current fuel year and Ickes has indicated his hope that the original production estimate of 575 million tons will be reached. This contemplates a 6-day operating basis. The Administrator still feels that anthracite production will be short. A previous statement by the Army indicated that cutbacks would reduce requirements for bituminous coal by 145 million tons in the next 12 months but this figure has been questioned by Deputy Administrator C. J. Potter, who indicated that the Army had failed to consider the reconversion needs of industry. As of August 11, Potter announced that anthracite production is 15.9 percent under 1944 figures and bituminous was 6.6 percent less than for 1944.

School and Home Experimenters Warned

A WARNING to all school and home laboratory students that the handling of explosives materials is potentially dangerous even when performed under expert supervision has been issued by the Institute of Makers of Explosives, an organization of the nation's industrial explosives manufacturers.

The warning was prompted by recent reports of serious accidents in high school and home laboratories in which young people making their own explosives have suffered serious injuries and, in several instances, loss of life.

The institute pointed out that although chemicals such as glycerin, nitric acid, sulphur, and potassium chlorate are relatively harmless by themselves, combinations of some of these chemicals are particularly dangerous and can result in an explosion which may cause loss of eyesight, serious burns, or even loss of life.

Even the common mortar and pestle have become dangerous weapons when used to mix some of the above-mentioned chemicals and others. The grinding and pounding action of the pestle in the mortar has in several instances caused the chemical mixture to explode with serious results.

Although chemists working in experimental explosives laboratories have a wealth of experience to guide them and equipment far superior to that of high school and home laboratories, they are subject to rigid safety rules.

If the ablest technical men in the field find it necessary to observe such rules, it is pointed out, inexperienced students are running grave risks when they venture into this field of experimentation.

In certain instances only one person can be in the laboratory, which has concrete walls several feet thick, and a thin roof which directs the force of an explosion upwards. A plentiful supply of water is available.

The potential dangers attending each experiment are thoroughly noted in advance and if an experiment is thought too dangerous, it either is not conducted at all or is conducted by remote control because the safety of the employes at all times is regarded as more important than the experiment.

The institute pointed out that the use of "glass-stoppered" bottles or even a slight jar to a bottle or vessel containing certain explosives mixtures is enough to cause an explosion.

Know this emblem. It signifies that the wearer is an honorably discharged veteran who has served our country in World War II

Personals

John D. Bradley, prominent Idaho mining man, has been elected president of the Idaho Mining Association, according to an announcement by **Harry Marsh**, secretary. Mr. Bradley succeeds **A. H. Burroughs**, head of the Talache and Custer Consolidated min-

ing companies. Mr. Bradley is vice president of the Bradley Mining Co., organized by his father, **Fred W. Bradley**, who died in 1933. The company has extensive mining operations in California, Nevada, and Idaho.

John D. Bradley is a director of the Bunker Hill & Sullivan Mining & Concentrating Co., of Kellogg, and a director of the Idaho First National Bank. With his two brothers, James and Worthen, he operates the Yellow Pine mine at Stibnite and the Ima mine at Patterson.

Dr. Francis A. Thomson, after a recuperation period of several months in Arizona, has returned to Butte to resume his duties as president of the Montana School of Mines.

A. S. Walter has recently completed mining examinations that took him into California, Colorado, and New Mexico.

The Bituminous Coal Producers Advisory Board of District 13 have elected **N. E. Cross** as chairman, to succeed **Darius A. Thomas**, who will devote his entire time to the operation of the mines of the Boothton Coal Mining Co. The board functions under the Solid Fuels Administration and has jurisdiction over Alabama, southern Tennessee, and Georgia. Mr. Cross has been associated with various coal-production agencies in the district since 1933.

Loren Wasson has been elected president and general manager of the Wasson Coal Co., Harrisburg, Ill., succeeding his father, deceased. He was formerly assistant general manager and general superintendent.

A. B. Crichton, president, Johnstown Coal & Coke Co., Johnstown, Pa., has been elected a director of the National Coal Association, representing the Maryland district. He succeeds **Arthur B. Stewart**, retired president of the Davis Coal & Coke Co., Baltimore.

Donald H. McLaughlin has resigned as general manager of Cerro de Pasco Copper Corporation because of the increased activity of the Homestake Mining Co., of which he is president. He will continue as vice president of Cerro de Pasco. **Vernon L. McCutchan** has been appointed manager of operations and will have charge of all operations at mines and metallurgical plants of Cerro. **George Train** is manager of the Lima office and **W. F. Walker**, chief geologist, is serving as assistant manager of operations. **A. R. Merz** has been added to the staff as metallurgical engineer and **J. O. Hosted** has been made superintendent of the Cerro mining department, succeeding **R. C. Philpott**, resigned.

Garrett Crews has been promoted to the position of assistant to the general superintendent of the Union Colliery Co., Dowell, Ill. Mr. Crews was formerly a member of the engineering department.

W. D. Turnbull has been appointed general sales manager of Kennametal, Inc. He formerly was identified with the Pomona Pump Co. and the Westinghouse Electric & Manufacturing Co., which is now known as Westinghouse Electric Corp.

M. W. Woolley, formerly manager of the Ore Purchasing Department of United States Smelting, Refining and Mining Co., is no longer connected with that company, according to an announcement by **F. S. Mulock**, vice president and general manager of western operations. Purchase of ore and concentrates for the company's Midvale plant will continue, as in the past, to be under the direction of **Robert Wallace**, manager of the Midvale plant. **F. X. Meyer**, chief clerk of the ore purchasing department, and **Blaine Watts**, ore buyer, will continue in their respective capacities under Mr. Wallace and may be reached at the company's offices in the Newhouse Building, Salt Lake City.

R. G. Lazelle, who has successfully held the positions of assistant mine superintendent, operating superintendent and mining engineer for the Island Creek mines, has been appointed general superintendent, with headquarters at Holden, W. Va. He succeeds **E. R. Cooper**, who has resigned to accept a position with the mining department of the Jones & Laughlin Steel Corp. Mr. Lazelle has been with Island Creek since shortly after his graduation from West Virginia University in 1922.

E. H. Snyder, president of Combined Metals Reduction Co., has announced promotion of **Leonard G. Thomas** from general superintendent at Pioche to executive assistant to the president. He succeeds **R. L. Dean**, who has become general superintendent of the Tri-State operations of the St. Louis Smelting & Refining Co., Baxter Springs, Kans. **S. S. Arentz, Jr.**, succeeds Mr. Thomas as general superintendent. **Paul Gemmill**, mine superintendent at the Prince Consolidated properties, Pioche, Nev., has joined Combined Metals as geologist in charge of mining and engineering at Pioche. All changes are effective as of August 15, 1945.

A. D. Hahn has resigned as acting director of the New Mexico State Bureau of Mines. **Eugene C. Anderson** is the new director. He was formerly chief engineer, American Metal Co., at Tererro, N. Mex., and recently was with the International Minerals & Chemical Corporation at their Montana rock phosphate property.

E. J. Burnell, vice president, Link-Belt Co., announces the appointment of **A. C. Fellinger** to the position of sales manager, power transmission machinery, with headquarters at the company's Ewart plant in Indianapolis. This change is made to fill the vacancy caused by the untimely death of C. Walter Spalding.

Francis O. Case, formerly general manager, Basic Magnesium, Inc., at Las Vegas, Nev., has been made assistant to the president, Anaconda Copper Mining Co.

S. A. Jones, who was formerly general mine foreman of the No. 5 mine of West Virginia Coal & Coke Corporation at Omar, W. Va., was recently promoted to the position of superintendent of Nos. 2, 4, and 6 mines of the Merrill Coal Co., Henlawson, W. Va.

Thomas M. Beaney has been appointed by Governor Martin, of Pennsylvania, as an anthracite mine inspector. He succeeds **Frank Kettle,** resigned. Mr. Beaney was formerly superintendent of No. 6 colliery, Jermyn-Green Coal Co., Pittston, Pa.

Roger Downer, of Downer Brothers assay office, Goldfield, Nev., is the new secretary of the New Mexico Miners and Prospectors Association. Offices of the association are being moved from Silver City to Room 10, Barnett Bldg., Albuquerque, N. Mex.

George H. Bucher, president, Westinghouse Electric Corporation, has announced that **J. M. McKibbin,** assistant to the vice president, is now in charge of all advertising programs for the corporation.

Daniel Harrington, chief of the Health and Safety Service, U. S. Bureau of Mines, has been reelected chairman of the mining standardization correlating committee of the American Standards Association, and **Lucien Eaton,** representing the American Mining Congress, has been reelected vice chairman, according to a recent announcement. In addition, the committee has elected as second vice chairman **M. D. Cooper,** divisional general superintendent, Hillman Coal & Coke Co., Pittsburgh, Pa., representing the Coal Mining Institute of America. The following members were also appointed to serve as an executive committee: **Benjamin F. Tillson,** consulting engineer, Montclair, N. J., representing the American Institute of Mining and Metallurgical Engineers; **William T. Davis,** supervising engineer, Ocean Accident & Guarantee Corporation, New York, representing the National Conservation Bureau; **E. A. Holbrook,** dean, School of Engineering, University of Pittsburgh, Pittsburgh, Pa., member at large.

Appointment of **H. E. Seanor** as vice president in charge of export sales for Mack is announced by **A. C. Fetzer,** vice president of Mack-International Motor Truck Corp.

George A. Ballam, Tucson, Ariz., field engineer in southern Arizona for the Arizona Department of Mineral Resources for the past four years, has resigned and will enter private engineering practice. Recently he was appointed to the state mineral department's board of governors.

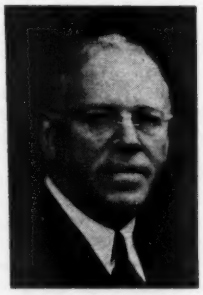
Carl Westerberg has been named superintendent of the Sunnyside mine location, succeeding **Arch Morrison.** Mr. Westerberg was formerly project manager for the Utah Fuel Co., operating in Carbon County, Utah.

Harold M. Beers, formerly mason foreman in the construction department of the Hudson Coal Co., has been promoted to the position of assistant superintendent of maintenance. He succeeds **Donald N. Smith,** resigned.

D. B. Joy has succeeded **E. A. Williford** as general sales manager of the National Carbon Co.

Ernest Agee is now connected with the Indiana Coal Producers Association, Terre Haute, Ind., an organization representing strip operators in the State of Indiana.

At its June 23 commencement exercises, the University of California bestowed the degree of Doctor of Laws (LL.D.) on **Edwin Letts Oliver,** president of Oliver United Filters,



Inc. The citation accompanying the award reads as follows:

> "Graduate of our College of Mining in the class of 1900; noted for his invention of the filter bearing his name, valued for its utility in metallurgy, chemistry and general industrial fields; one whose activities have been carried on not only in the United States but in other lands as well; a loyal alumnus of the university, devoted to its well-being, man of far-flung interests, resting on the foundation of his own inventive genius."

This degree is a fitting award to a man who has contributed so much to industrial progress.

—*Obituaries*—

Charles Snelling Robinson, 81, retired vice president of Youngstown Sheet & Tube Co., died July 22 at Youngstown, Ohio. Mr. Robinson, active with the company since 1906, was in charge of mining and materials in recent years.

Clarence A. Hight, 77, chairman of the board of the United States Smelting, Refining & Mining Co., died July 1 at his summer home at Annisquam, Mass. In 1923 Mr. Hight retired from the law firm of Coolidge & Hight to become vice president and general counsel for U. S. S. R. & M. He became president of the firm three years later and in 1937 was made chairman of the board. He was an official in several other mining companies at various times.

F. F. Taggart, president of the Spruce River Coal Co., with mines in the Kanawha District of West Virginia, also president of the Pleasant Valley Mining Co., with mines in Ohio, died at his home in Massillon, Ohio, on July 24 at the age of 72. Mr. Taggart was a prominent factor in the industry in both West Virginia and Ohio for many years.

Burrell R. Hatcher, 60, native Arizonan and former southwestern department manager of the American Smelting & Refining Co., at Tucson, at his retirement in 1931, died on July 27 in San Diego, Calif., after a year's illness.

Michael J. Curley, 70, retired mining engineer and former manager of the New Cornelia branch of the Phelps Dodge Corporation at Ajo, Ariz., died in Santa Monica, Calif., on July 13. A native of Ireland, he entered Arizona mining in 1913 after employment in mines of Michigan and Minnesota. He managed the extensive New Cornelia open-pit workings from the time of their inception in 1913 until his retirement in 1940.

One of the West's few women mining prospectors, **Mrs. Grace Fisher Cornwall,** 83, died on July 5 in Douglas, Ariz. She was a talented pianist, and at one time appeared in the famed Bird Cage Theater of Tombstone, Ariz. She arrived in Arizona in 1900 and opened a music studio in Bisbee. In 1904 she began prospecting near Jerome; her claims were later sold to become a part of the wealthy Verde Extension. For six years she mined gold in the Klondike and Yukon, Alaska, and returned to Arizona in 1911. From that time until recent years she operated a studio of music in Douglas.

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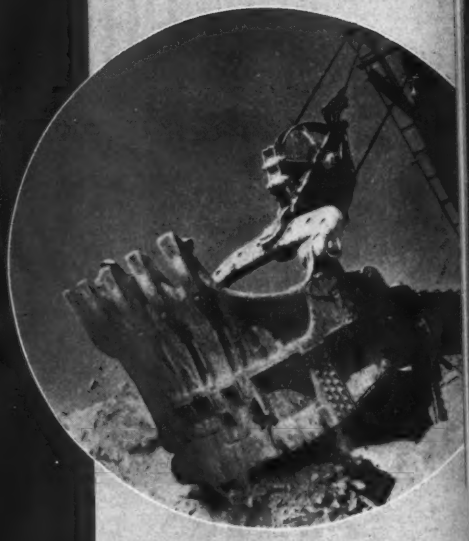

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3/4 cu. yd. to 40 cu. yds.

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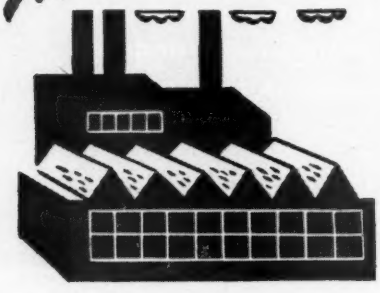
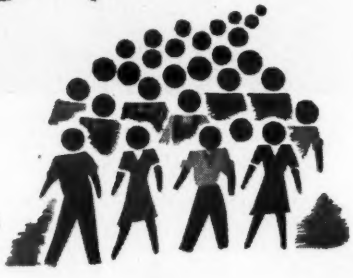
To your Industry

and your Employees





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Did you know that yours is one of 240,000 companies maintaining a Payroll Savings Plan? Not only is this combined effort fostering national security, but also creating a lucrative postwar market for you . . . and all American industry!

Have you realized that 76% of all employed in industry are now enrolled in the Payroll Savings Plan . . . averaging a $25 bond each month per employee? Through this plan, millions are now looking forward to homes, educational opportunities and old age independence!

Surely, so great an asset to your country, your company and your employees is worthy of your continued . . . and increased . . . support! Now is the time to take stock of your Payroll Savings Plan. Use selective resolicitation to keep it at its 7th War Loan high! Keep using selective resolicitation to build it even higher!

The Treasury Department acknowledges with appreciation the publication of this message by

MINING CONGRESS JOURNAL

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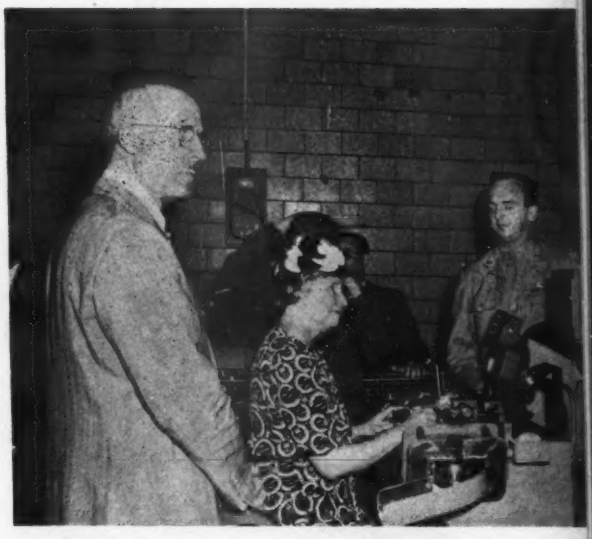
NEWS and VIEWS



A new electronic sound gaging device, expected to bring employment to thousands of blind people, is demonstrated by Helen Keller at Timken Roller Bearing factory, Canton, Ohio. W. E. Umstattd, company president, and Capt. Paul Moriarity, blind former A. A. F. pilot, were present

Eastern States

Island Creek to Celebrate 40th Anniversary

The Island Creek Coal Company will celebrate its 40th anniversary December, 1945, according to recent announcement over Station WLOG by Mr. R. E. Salvati, vice president. Preliminary preparations are being taken in the form of broadcasts from WLOG Studio in an effort to acquaint the public with facts about the company's beginning, its past record in supplying the American coal consumer, production and sales organization, emphasis on safety and preparation developments, reserves of unmined coal and its outlook for the future. These broadcasts will embrace a general resume of the interesting features relating to the company as an important unit in the American bituminous coal industry.

Night Mining Classes Completed

The twenty-second annual dinner of the night mining classes of Western Maryland was recently held at the William James Hotel, Oakland. Thirty-seven students who had faithfully attended the night classes one night each week for 33 weeks, and who had completed the prescribed course of study were awarded Certificates of Attendance. L. C. Hutson, Vocational Mining Instructor of Kitzmiller, Md., was the instructor of these classes and the subjects taught were Coal Mine Ventilation, Air Coursing, Map Reading and Mine Gases.

G. Marshall Gillette, vice president of Northwestern Mining and Exchange Company, DuBois, Pa., gave the principal address. He told of the many problems that confronted the State commission in drafting the mining laws for Maryland and of the necessity of having laws and regulations that were fair to both operator and miner. Dan Walker, engineer in charge of the Fairmont Station, Federal Bureau of Mines, spoke briefly concerning the benefits of the mining classes. He especially expressed the need of cooperation on the part of both operators and miners.

J. J. Rutledge, Chief Mine Engineer of the Maryland Bureau of Mines, was toastmaster and Walter W. Dawson, an attorney of Oakland, gave the address of welcome to the visiting miners and guests.

F. E. Rathbun, Superintendent of the Garrett County School, presented the certificates and spoke in praise of the State and county educational system.

V-J Day Effect on Anthracite

Anthracite commercial production for the past several weeks has maintained a fairly constant level—only slightly below the corresponding weekly figures of last year. However, the cumulative total coal produced in the current coal year is now approximately 4,000,000 tons behind 1944. Even if all miners in the services were returned at once, it would be virtually impossible to overcome such a deficit. For instance, at the current per-miner production, the immediate return of 5,000 miners could only be expected to provide half the tonnage deficit. In addition, many problems of equipment and transportation confront the industry, so that it is almost a certainty that this year's production will be less than last year's, possibly by three or four million tons.

Offsetting this, there is bound to be some relief as a result of V-J Day. It is practically certain that light oil will be more plentiful; even the temporary shutdown of war production plants during reconversion is bound to save some heavy oil and soft coal (even though the latter is sorely needed for stockpiles), coke for domestic consumption should be more free, and even wood will benefit from increased manpower. In addition, there will be such other factors as forced economies, willingness to use hoards of coal, and slackening of military demands.

Whether a decreased demand will balance a decreased supply is anybody's guess. Therefore, the soundest advice from the industry to the consumer is to continue all possible measures of economy and conservation.

Goodyear Photo

Heavy duty equipment such as used extensively in the mining industry played an important part in highway construction at Oakridge, Tenn., where much of the atomic bomb development took place

Anthrafilt Used in Making Atomic Bomb

According to Cadwallader Evans, Jr., vice president and general manager of the Hudson Coal Co., anthrafilt, a specially prepared small size of anthracite, played a part in the manufacture of the atomic bomb.

"The first order for anthrafilt for these new and very secret plants in the far-off State of Washington was received by the Hudson Coal Co. on October 26, 1943. Shipments began on a small scale on December 11, 1943, and were continued from time to time until November 10, 1944.

"A total of 2,466 tons of anthrafilt was sent to the State of Washington, the last carload starting on October 5, 1944. The carload shipments did not quite furnish enough for all the filters, and as a consequence an emergency express shipment of 27½ tons was started off from Marvine breaker in Scranton on November 10, 1944. The express charge on this shipment was $6,444.42, which makes it clear that the material was urgently needed."

Plan Mineral Resource Study

Rehabilitation and expansion of New Jersey's mineral industry, which has dwindled in output, income and employment in recent years while national output has increased, is the objective of a geological and ceramic study of the State's mineral resources which will be undertaken by a new Bureau of Mineral Research at Rutgers University.

Organization of the new bureau, a division of the College of Arts and Sciences, the drafting of a plan to guide its investigators and the personnel of the bureau, were made known in an announcement by Dr. Robert C. Clothier, president of Rutgers, at a recent meeting of the Natural Resources Committee of the State Chamber of Commerce.

In addition to the members of the committee and representatives of the university, those present included Commissioner Charles R. Erdman, Jr., of the New Jersey Department of Economic Development, and Meredith E. Johnson, State geologist.

Announcement was also made that Dr. Alfred K. Snelgrove, chairman of the Department of Geological Engineering of the Michigan College of Mining and Technology and geological consultant to the government of Newfoundland, has been appointed professor of geology at Rutgers and director of the bureau.

Dr. Snelgrove will work in close cooperation with State Geologist Johnson, who has been named as a research associate in geology at Rutgers. A detailed plan for the mineral resources study has been prepared by Paul M. Tyler, mineral economist on leave from the U. S. Bureau of Mines. Tyler was appointed on May 1 as a research consultant to the Rutgers University Research Council.

In 1929 the mines, quarries, and clay pits of New Jersey yielded products worth $72,000,000, but by 1943 their output was down to $38,000,000 despite a nation-wide increase in mineral products output in the same period. New Jersey, which had once been an important exporter of various sands and clays, has become an importer of some of these products while local deposits lie idle or are being worked on a steadily diminishing scale.

The Rutgers University Research Council, the State Department of Conservation and Development, the State Department of Economic Development, representatives of the State's mineral industries and the Natural Resources Committee of the

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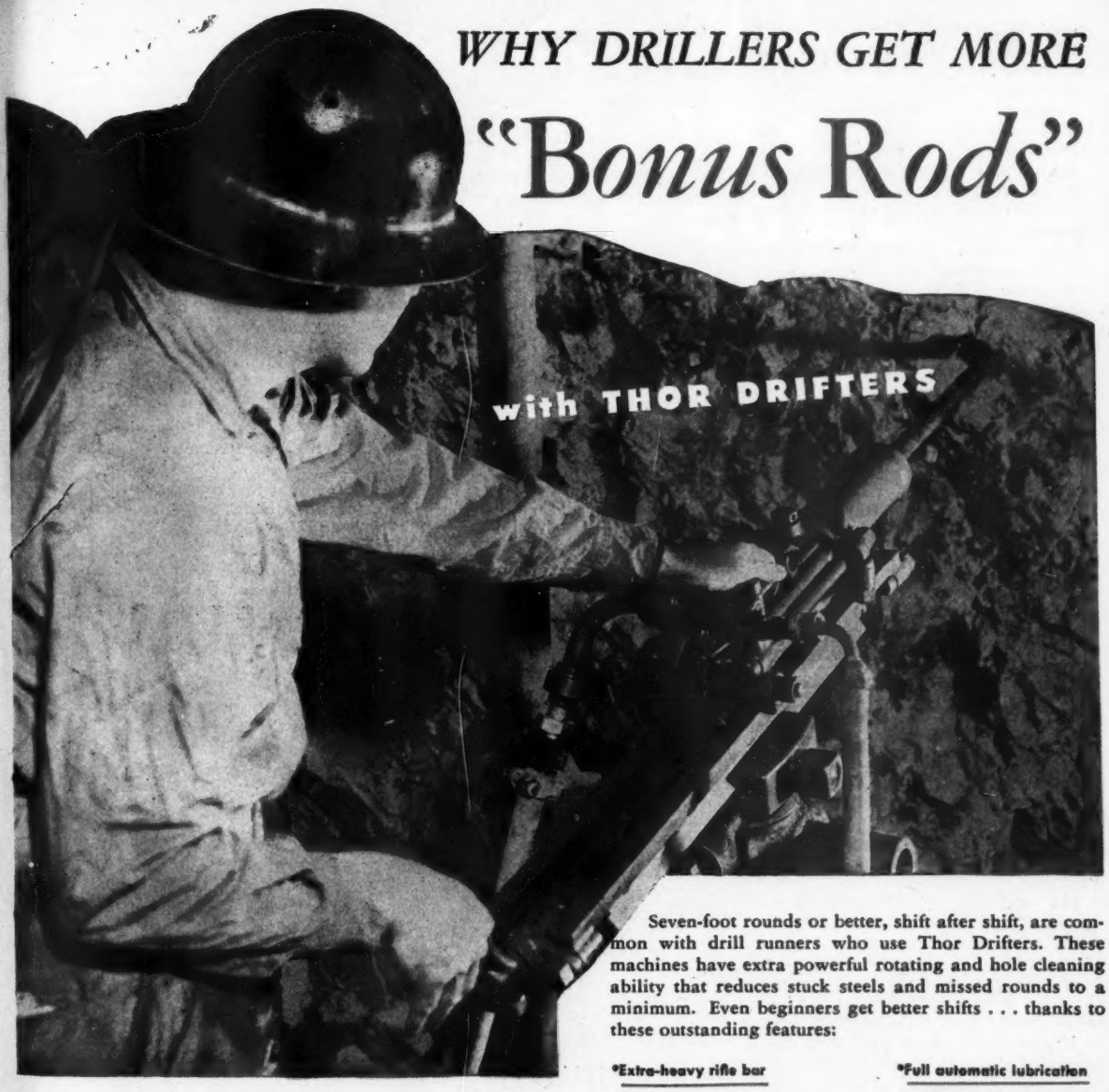
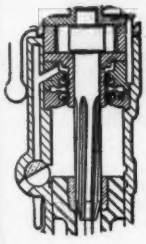
WHY DRILLERS GET MORE "Bonus Rods"



Seven-foot rounds or better, shift after shift, are common with drill runners who use Thor Drifters. These machines have extra powerful rotating and hole cleaning ability that reduces stuck steels and missed rounds to a minimum. Even beginners get better shifts . . . thanks to these outstanding features:

- *Extra-heavy rifle bar
- *Full automatic lubrication
- *Short-travel valve
- *Long-wear forward bearing
- *Positive throttle control
- *Rugged retainer
- *Air-cushioned piston
- *Straight-line hole blowing



Extra-Heavy Rifle Bar Assembly Assures Dependable Rotation For Fast Drilling

The heat-treated, alloy-steel rifle bar assembly in Thor Drifters has oversized flutes for extra strength and positive ratchet action. Even in soft or ravelly ground you get dependable rotation for steady drilling.

Made in 3" and 3½" diameter cylinder bore models for light and heavy duty drilling, Thor Drifters can be furnished with hand or power feed to take a variety of sizes and types of steels and mountings. For full specifications on these and Thor Sinker and Stoper Rock Drills, write for catalog No. 42A.

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Thor PORTABLE POWER **TOOLS**

PNEUMATIC
UNIVERSAL ELECTRIC
HIGH FREQUENCY ELECTRIC

State Chamber of Commerce believe that with a more complete knowledge of New Jersey's mineral resources, particularly those of a non-metallic character, and with the technological developments of recent years, new mineral industries can be brought to New Jersey, those which are dormant can be revived, and those which are still active can be brought to greater output.

An example of how new technological developments can revive an industry is found in the new use of New Jersey marl or greensand as a water softener. This material was formerly the basis for an important fertilizer industry, but this use for it was almost entirely abandoned. Now the industry has been revived with the development of its use in an entirely new and larger field.

The membership of the Bureau of Mineral Research comprises Dr. Snelgrove, director; State Geologist Johnson, Tyler, all the members of the faculties of the geology and ceramics departments, and Dr. Peter A. vander Meulen, professor of chemistry.

Consolidated Coal Moves Offices

Consolidation Coal Company, Inc., 30 Rockefeller Plaza, New York 20, N. Y., has announced that as of July 26, 1945, the general offices of this company, including the executive, corporate, treasury, accounting and general sales departments, formerly located in New York City, were removed to Pittsburgh, Pa. and located at 2000 Koppers Building, Pittsburgh, Pa.

The chairman of the board of directors, Eastern district sales department, export sales department, office of consulting engineer, and manager of insurance department will remain at their present address, 30 Rockefeller Plaza, New York City. Robert C. Hill is chairman of the board and George H. Love is president.

T. C. I. to Increase Tin Plate Capacity

The Tennessee Coal, Iron & R. R. Co. have a new improvement program designed to meet the increased post-war demands for tin plate products. The project contemplates an increase in tin plate capacity in the Fairfield Tin Plate Mill and the installation of feeders and cleaners for 28 tin stacks. The increase in capacity will approximate 52,000 tons annually. This new improvement program is a continuation of a trend toward improved facilities to meet the trade demands for the more modern cold-reduced product. Date of completion will depend upon availability of materials and labor.

"Blasting Cap!"

THE story of the blasting cap is dramatically portrayed in a new film of that title, just completed by the Institute of Makers of Explosives. Its purpose is to acquaint the public, and especially children, with the dangers of children playing with blasting caps.

The new picture is an all-color, 16-mm. sound version, especially produced for school safety programs to inform boys and girls of the dangers hidden in the apparently harmless little blasting caps. Children should be taught that these caps are used to set off millions of tons of high explosives which every year serve us in such tasks as mining our coal and metal, driving tunnels, building roads, draining our swamps, and clearing our land. Blasting caps are part of a peacetime industry, but when they sometimes fall into the untrained hands of careless or uninstructed boys and girls, serious injury may result.

Prints of the film are available for scheduled meetings, on request to the Institute of Makers of Explosives, 103 Park Avenue, New York 17, N. Y.

The institute also has illustrated posters and leaflets for free distribution which are suitable for bulletin board use or in discussion groups.

Hercules to Close Four Plants

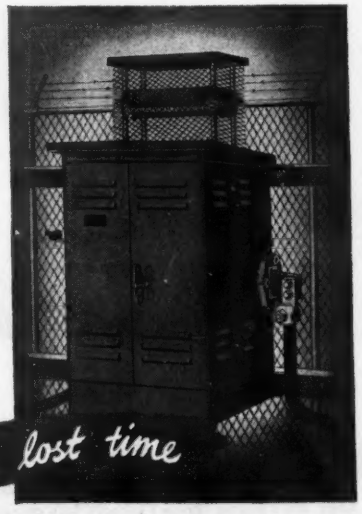
In accordance with instructions from the War Department, Hercules Powder Co. has begun closing down four of the Government-owned plants which the company operates, it was announced August 18 by W. R. Ellis, general manager of the explosives department.

The four plants being closed down are: New River Ordnance Plant, Pulaski, Va.; Radford Ordnance Works, Radford, Va.; Volunteer Ordnance Works, Chattanooga, Tenn.; and Missouri Ordnance Works, Louisiana, Mo.

Maintenance men have started the job of putting the four plants on a "stand by" basis, which means they can be activated within 120 to 180 days, should the occasion arise.

Both Badger Ordnance Works and Sunflower Ordnance Works will continue on their present rocket powder production schedule until further notice.

I-T-E
AUTOMATIC
RECLOSING
CIRCUIT
BREAKERS...



Reduce lost time

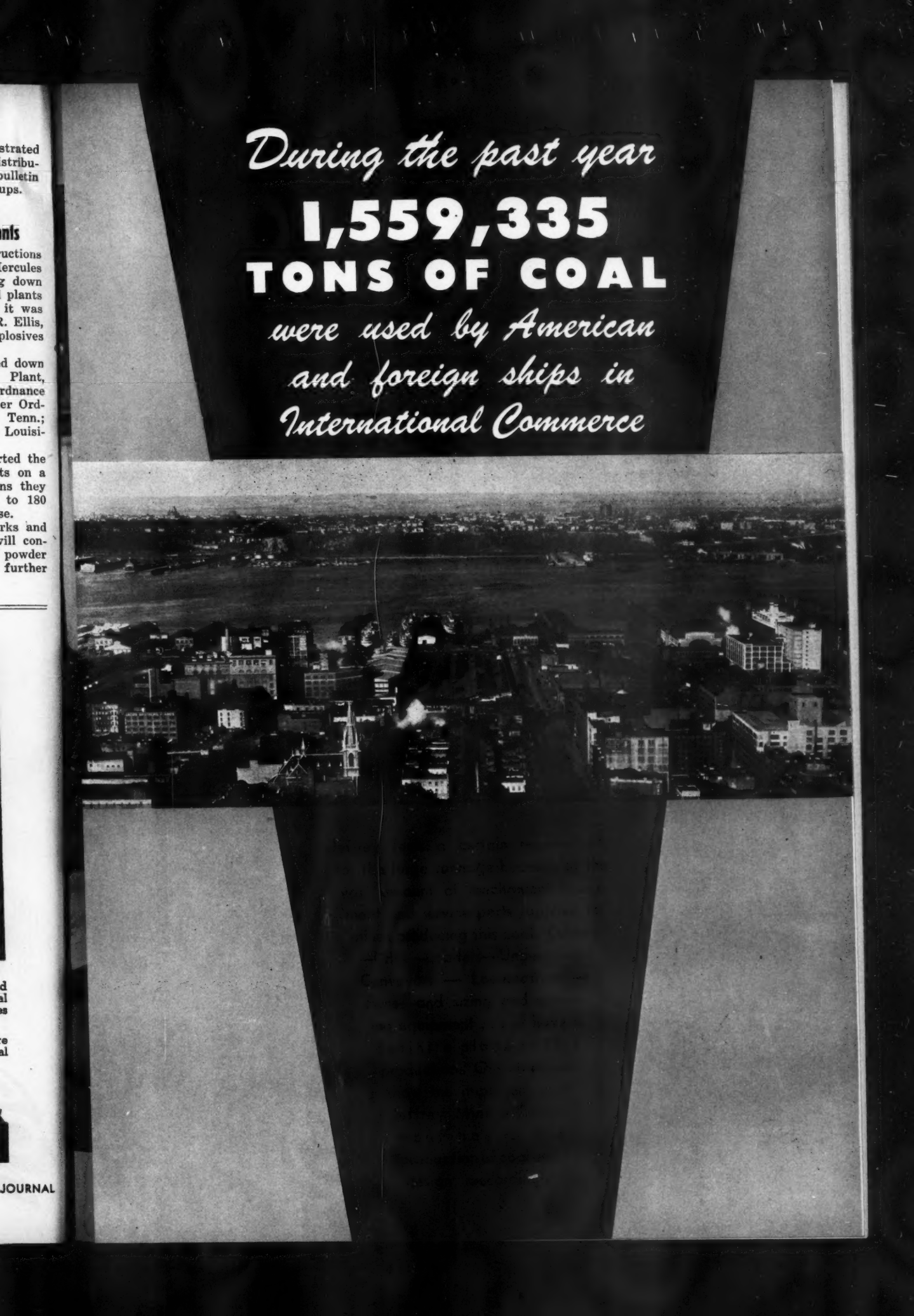
Unattended Sectionalizing Circuit Breakers stand guard twenty-four hours a day to localize electrical disturbances and resume service the moment lines are cleared.

Not only is continuity of service improved, but fire hazards are reduced, maintenance lessened, total energy and power demand lowered.

WRITE FOR CATALOG 2502

I-T-E AIR SWITCHGEAR

Representatives in Principal Mining Areas


During the past year
1,559,335
TONS OF COAL
were used by American
and foreign ships in
International Commerce

Jeffrey

UNDERGROUND CONVEYORS

Jeffrey underground conveyors speed up production and reduce transportation costs in many operations. Jeffrey builds 17 standard units — chain or belt types — from which 54 combinations are available. There is a type to meet every mining condition. Our engineers and technicians can determine the type best suited to coordinate your underground requirements into a smooth-operating system.

Jeffrey CONVEYORS

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JEFFREY EQUIPMENT FOR COAL MINES

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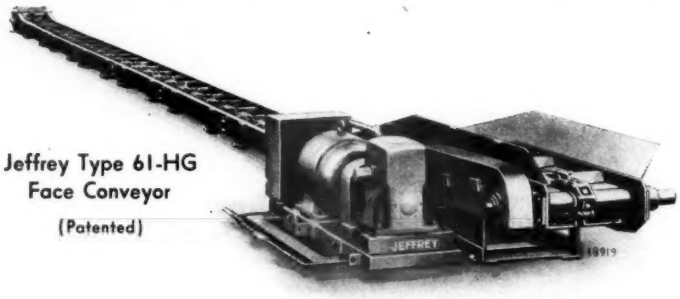
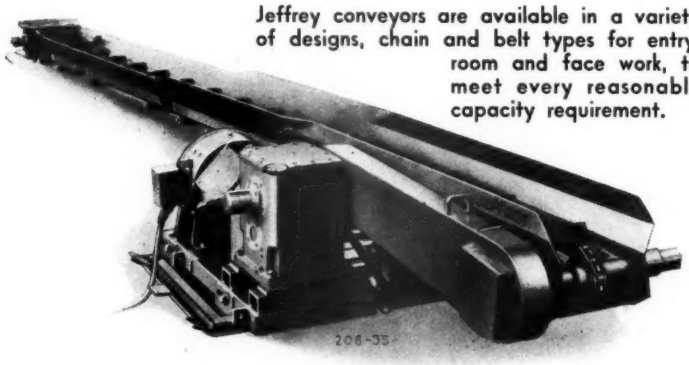
- LOADERS
- LOCOMOTIVES
- SCREENS



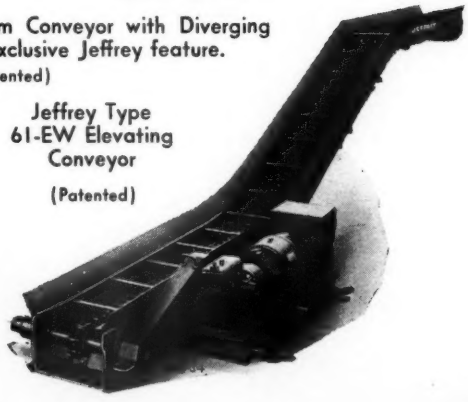
Jeffrey Type 61-HG Face Conveyor
(Patented)

Jeffrey conveyors are available in a variety of designs, chain and belt types for entry, room and face work, to meet every reasonable capacity requirement.



Jeffrey Type 61-AM Room Conveyor with Diverging Type Head End, an exclusive Jeffrey feature.
(Patented)

Jeffrey Type 61-EW Elevating Conveyor
(Patented)



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Powel Advocates Drastic Curtailing of German Industry

CONQUERED Germany's electrical equipment industry, still grossly expanded despite 40 percent destruction by Allied bombs, must be trimmed to normal peacetime production levels, in the opinion of Charles A. Powel, newly appointed chief of the Electrical and Radio Branch of the Allied Control Commission. Mr. Powel, president of the American Institute of Electrical Engineers, is taking leave of absence from his position of headquarters engineering manager for the Westinghouse Electric Corporation to go to Germany to assume his new post.

"We know that the electrical equipment industry is vital to the waging of war," Mr. Powel asserted recently, "yet it would be impracticable to blot out this industry from the Reich. Instead, we must assure that the industry henceforth produces only sufficient equipment to fill the peacetime needs of Germany, and even then we must keep a careful check on that equipment to see that applications are in line with peacetime pursuits."

Plans Survey

Mr. Powel has first-hand knowledge of the expansion of Germany's electrical industry in pre-war years. He visited the Reich in 1938—a year before Britain and the Nazis went to war—and was amazed to find that production there probably exceeded that of the United States, the most electrically-minded country in the world.

"With this in mind," Mr. Powel said, "my first task under the Allied Control Commission will be to make a complete survey to determine just how greatly this expansion overshot the nation's normal needs. We will study the Reich's normal needs per year for a period as far back as, perhaps, 15 years. We will then study the extent and nature of existing facilities and recommend to the Commission a basis for permissable future activity of the industry."

Mr. Powel said his survey probably would take him to all parts of Germany where electrical equipment factories exist, including zones occupied by the British, French, and Russians as well as the American occupied sector.

Warns Against Being "Soft"

While advocating that Germany be permitted a certain amount of industry—manufacturing to which it is naturally suited—Mr. Powel pointed out the danger of the possibility that the Allied Nations may become "soft" after a short period of control in Germany.

Chas. A. Powel

"I am convinced that strict control over Germany must be maintained for two generations—40 to 50 years—so that the thinking of the people can be changed by education," he said. "If we keep going for five years and then grow 'soft,' we will have lost the war.

"Somewhere between the two extremes of making Germany a completely agrarian nation, as advocated by some, and allowing it any and all industries on the basis that they are essential to European economy, as advocated by others, there must lie a middle road. This middle road will permit the Germans a satisfactory balance between agriculture and industry and give them a decent standard of living without allowing them to establish a new war potential. This policy must be found and rigidly adhered to for years."

Urges Banning Some Industries

Mr. Powel reiterated his belief in the merits of a plan previously suggested by him jointly with presidents of four other major engineering societies—civil, mining, mechanical, and chemical.

This plan advocates the banishment of three important German industries vital to war and heavy cuts in two other industries on the basis that the country is not naturally suited to such manufacture and the plants have been built up only under a false wartime economy. Industries this plan would ban or curtail are:

1. Synthetic oil. Germany should be made to import all its oil, and this importation should be limited to normal peacetime needs. It has little natural oil resources.

2. Eliminate aircraft plants and equipment. Germany's civilian needs of airplanes should not be more than 100 per year. They should be made to purchase these abroad.

3. Destroy all aluminum and magnesium plants. There are no bauxite deposits in Germany, therefore no justification for the industry.

4. Eliminate 75 percent of Germany's synthetic nitrogen plants, as nitrogen is the principal ingredient of explosives.

5. Eliminate 50 percent of Germany's steel-making capacity. Cost of producing steel in Germany has always compared unfavorably with costs in the United States and England.

Revamp Educational System

A complete revision of the German educational system must accompany armament curtailing moves, Mr. Powel said.

The engineering executive said that he hoped to get a system of operation for the electrical and radio industries of Germany organized and working smoothly and then return to Westinghouse.

The great responsibility thrust upon Mr. Powel in this assignment, in which he heads the electrical and radio manufacturing industries in Germany, is not an entirely new experience for him. He has successfully guided the nation's leading electrical engineering organization in important work during the past year. At Westinghouse he has directed the activities of domestic engineering, engineering laboratories and standards, and has headed up the foreign engineering activities of the company.

During World War I he served as a member of the British War Mission to the United States and he has had extensive experience as a representative of private industry.

Liquid Tire Inflation

LIQUID inflation may be used in place of air for certain types of industrial equipment such as road graders, power mowers and industrial tractors.

W. A. Kemmel, manager of truck tire sales for The Goodyear Tire and Rubber Company, has announced that after extensive tests approval has been given the use of Solution 100—Goodyear's method of filling tires 100 percent with liquid—in tires of vehicles which carry only the weight of the vehicle and travel at relatively slow speeds.

In such service, the use of Solution 100 assures increased traction, constant inflation pressure, and in grader tires reduced "chattering" of the blade.

Use of liquid inflation is not recommended for load-carrying tires of trucks, cranes, trailers and earth moving vehicles. Increases in internal pressure occur in tires filled with liquid solution in cases where payloads are carried.

Central States

Discuss Coal Research Plans

Members of the Technical Advisory Board of Bituminous Coal Research, Inc., met at Columbus, Ohio, recently with the fuels division staff of Battelle Memorial Institute to review current research activities of the coal industry and to make plans for continuing laboratory work on a number of major projects.

An encouraging report was made by John I. Yellott, director of research for the Locomotive Development Committee of BCR, who outlined the experimental work now getting under way to develop a coal-burning gas turbine. He emphasized that such a turbine may be utilized in locomotives, or in stationary plants, to meet competition from the Diesel engine.

Preliminary findings were revealed by the research engineers working on residential group heating, a plan for heating a number of houses from a single, central stoker-fired plant. Their report showed that by district heating the ultimate convenience in comfort heating is possible with coal in community housing projects, and at costs less than for heating individual homes with competing fuels.

A report that highlighted the meeting indicated that probably more than 500 railroad locomotives have been equipped with overfire jets, a BCR development to eliminate smoke.

A new note in the coal industry's research program was sounded when it was announced that BCR is now forming regional research committees to "supplement the work of the Technical Advisory Board and spread interest and knowledge concerning coal research." Report of this new BCR activity was made to TAB members by Earl C. Payne, consulting engineer of Consolidation Coal Co., New York, N. Y., who stated that four regional units are now organizing in Kentucky, Indiana, West Virginia, and in Kansas-Missouri area. He added that similar groups are to be formed by other local operators' associations, in cooperation with regional groups of technical societies and mining engineering schools.

The TAB group inspected laboratory projects under way for BCR at Battelle, including the smokeless stove, the inverted underfeed stoker, tests for rating warm air furnaces, a smokeless hand-fired furnace, flow model of locomotive air supply and numerous other fact-finding tests needed by the bituminous coal industry.

Safety Contest at Bellaire

Coal mine employes and their families looked on while eight teams composed of rescue squads from near-by mines competed in a first-aid contest held July 15, at Bellaire, Ohio. Winner of the event was the Goodyear team, of the Wheeling Township Coal Co. (subsidiary of the Goodyear Tire & Rubber Co.).

Sponsored by the State of Ohio, in conjunction with the United Mine Workers Union, the event was the first of its kind since 1925. Present for the occasion were mine workers from the State's three largest mining counties (Belmont, Harrison, Jefferson) and from neighboring West Virginia. Special guests included Ohio's Governor Frank J. Lausche; J. L. Ireland, president of the Ohio Coal Association; and Adolph Pacifico, vice president of Local No. 6, United Mine Workers.

Eight teams, composed of six men each, vied for top honors. First-aid problems involving accidents common to coal mines were given by the judges to the captain of each team. A time limit was set, and at the end of a specified period results were carefully checked.

Climaxing the ceremonies was a brief talk by Governor Lausche, stressing the value of efficient first aid in saving human life, after which he presented each of the winning team with an attractive aviation pilot's watch. The prizes were donated by the United Mine Workers Union. Winning team members included Louis Jesalosky captain, John Douglas, John Hayest, Rennie Bradley, Kenneth Greer, and John Bober.

New Superphosphate and Mixed Fertilizer Plants

Plans for the construction of two fertilizer plants by International Minerals and Chemical Corporation were announced by Louis Ware, president of the corporation.

A new $100,000 plant will be built in Mason City, Iowa, and a $200,000 plant will be erected in Hartsville, S. C., to replace a plant owned by the corporation there which was destroyed by fire in December. Both will be completely modern throughout and equipped with all the latest labor-saving machinery.

The Mason City plant is being built to meet growing demands for International fertilizers in Iowa and Minnesota and will produce a complete line of mixed fertilizers for corn, alfalfa, small grains, clover and truck crops, Mr. Ware said.

The new plant at Hartsville, which

The Goodyear team in action on a special problem in first aid. Inset: Governor Lausche of Ohio and Jack Kidney, company safety director

Tailings Disposal at United Mining and Milling Co. Plant, Livingston, Wis.

Tailings discharge containing up to 40 percent solids is pumped 400 ft. at the rate of 800 to 1,000 tons per 24 hours by an Allis-Chalmers 6" x 8" slurry pump. Fluid discharges onto a dump 100 ft. high and 300 ft. long

will be larger than the original one because of increasing demand in the South Carolina area, will produce mixed fertilizers and manufacture superphosphate.

Construction on both plants will begin soon and they are expected to be in operation in time for the spring shipping season in 1946.

Stripping Tax Bill Vetoed and Demonstration Test Program Authorized

On July 27, Governor Dwight H. Green, of Illinois, disposed of the last remaining bill enacted by the Sixty-fourth General Assembly, when he vetoed the measure which would have levied a new state tax of 4 cents a ton on all strip-mined coal. Revenue from this source was to have been set aside for the purpose of leveling and restoring the topography of the mined land.

In vetoing the bill Governor Green gave as one of his reasons his opposition to any new state taxes at this time. The strip measure was planned to replace a 1943 law which has become inoperative because of a court injunction. The governor said the tax was not justified and, moreover, discriminated against that particular kind of coal mining.

H. B. 817 has been signed by Governor Green and is now law. This bill creates a commission to conduct a demonstration test program for investigation of and experimentation with Illinois coal and coal products to determine the feasibility of methods having commercial possibilities and promise. The commission consists of two members of the House, two members of the Senate and two members appointed by the governor. The measure appropriates $80,000 to the commission for the purposes outlined.

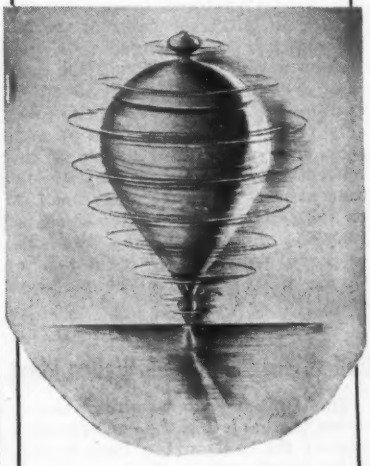
American Zinc Buys Evans-Wallower Holdings

American Zinc Company of Oklahoma, a subsidiary of the American Zinc, Lead and Smelting Company, has purchased and taken over the operation of the No. 7 property of the Evans-Wallower Zinc, Inc., it was announced by John L. Inman, district manager for the American company.

The property, situated northeast of Cardin, comprises the Evans-Wallower No. 7 mill, mines and 200-acre lease. Included in the 200-acre tract of

The "C·M·I" CONTINUOUS CENTRIFUGAL

This dryer reduces the moisture content of the finer coal sizes to a point where there is no clogging of spouts, cars, bins, etc., also no freezing in transit or storage.



At many plants this machine is also reclaiming sludge and slurry coal and making a product that is sold for use in powdered coal plants, on chain grate stokers or blended back with some of the larger sizes. Much good carbon that had previously been thrown away is now made into a saleable product.

CENTRIFUGAL AND MECHANICAL INDUSTRIES INC.
3600 SOUTH SECOND STREET
ST. LOUIS 18, MO.

Kenoyer land, besides the No. 7 lease, are the Evans-Wallower Nos. 3 and 8, LaClede and Dorothy Bill leases.

No major changes in plant or equipment are contemplated for the present, Inman said. Ralph E. Calhoun, assistant district manager for the American company, was active in the acquisition of the property and will continue in his present capacity under the new management. W. F. Netzeband will be superintendent in charge of operations.

According to Floyd Gooch, manager of the Evans-Wallower company, the company will continue its operations at the No. 4 property, situated between Cardin and Picher. Present offices of the company will be maintained at the same location.

Gooch stated that the No. 7 property was opened in 1918 by the old Golden Rod Mining and Smelting Company, which subsequently became the Evans-Wallower Lead Company. In August, 1937, the name of the latter company was changed to Evans-Wallower Zinc, Inc. During the more than a quarter-century period of operations to August 1, 1945, the property produced 2,041,144 tons of mine rock, from which 128,179 tons of zinc concentrates and 19,631 tons of lead concentrates were sold, and from 1933 to 1937, the lead company retreated 1,396,654 tons of tailings from the property, from which 16,120 tons of blende and 119 tons of galena were extracted.

United Zinc Builds Park-Walton Plant

The United Zinc Smelting Corporation is completing the concentrating part of the mill on the Park-Walton lease, southwest of Melrose, Kans., which is about seven miles west of the Picher zinc-lead field of the Tri-State District.

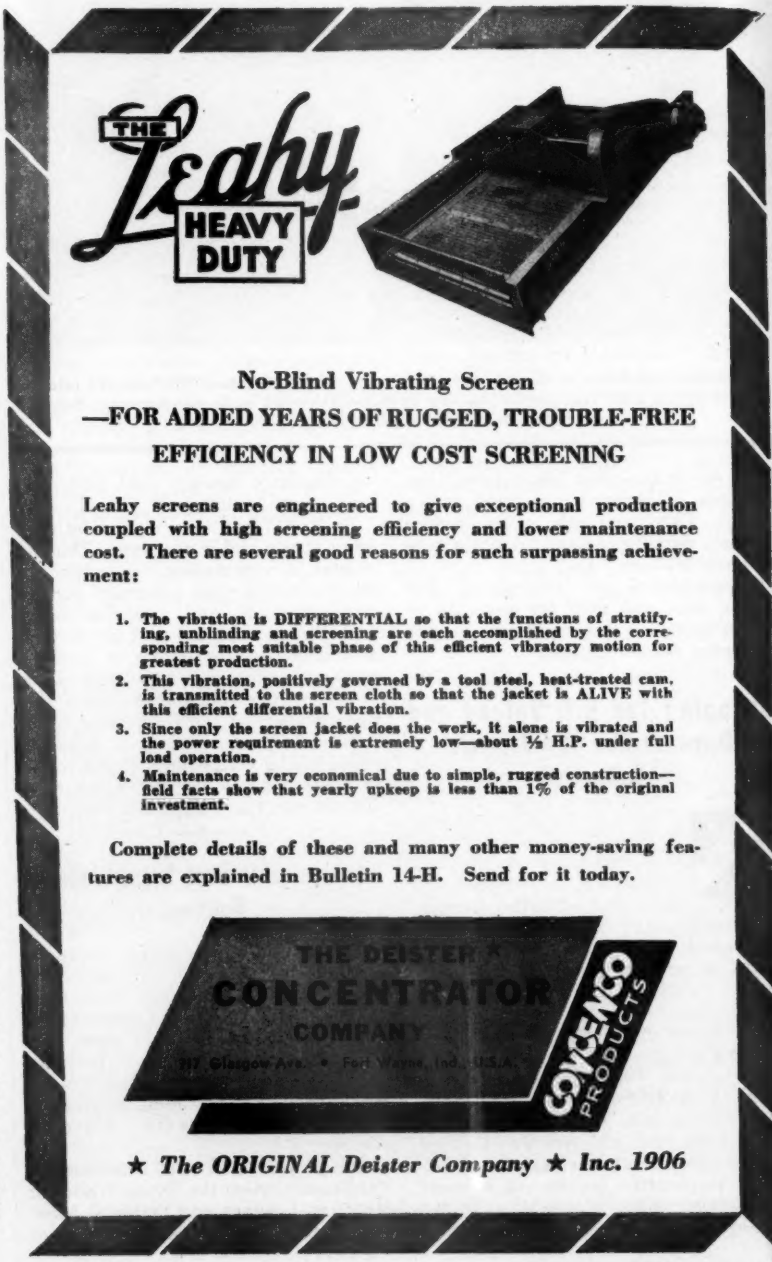
Material and equipment is being removed from the old Barr mill, north of Picher in Kansas, which was acquired some time ago from the Eagle-Picher Mining and Smelting Company. Certain other new equipment is to be installed in the rebuilt plant.

The crushing plant, which was removed from the Barr property several months ago, was rebuilt and placed in operation recently. The primary crushing unit consists of a 30-inch Rogers crusher and a set of 55-inch Rogers rolls. A storage hopper for crushed ore also has been built in conjunction with the crushing plant, which is situated southwest of the No. 2 mine shaft derrick and hopper on the lease. Another set of large return rolls, steel jigs, ball mill and flotation machines will be included in the equipment of the mill proper, which, when completed, will have a capacity of 30 to 35 tons of ore an hour.

Work on the concentration plant was started about two weeks ago and is expected to be completed within 90 days, according to the district manager of the company. Ore rock from two shafts—Nos. 1 and 2—which are situated several hundred feet apart, has been trucked to the company's Royal mill, southeast of Picher, for nearly two years.

In addition to development work and mining carried on at the 310-ft. level, which contains principally lead ore, crosscuts have been driven from both the Nos. 1 and 2 shafts on the 350-ft. levels to a narrow run of low-grade zinc ore. Churn drilling has indicated ore of better grade some distance to the south.

It was reported that heavy water flow is frequently encountered when drilling and shooting underground on the lower level, flooding the workings for several days at a time before it can be lowered sufficiently to resume mining operations. The water is being handled by four direct-driven electric-powered Pomona pumps—one of 50 horsepower and the others of 150 horsepower each.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No-Blind Vibrating Screen
—FOR ADDED YEARS OF RUGGED, TROUBLE-FREE
EFFICIENCY IN LOW COST SCREENING
Leahy screens are engineered to give exceptional production coupled with high screening efficiency and lower maintenance cost. There are several good reasons for such surpassing achievement:
1. The vibration is DIFFERENTIAL so that the functions of stratifying, unblinding and screening are each accomplished by the corresponding most suitable phase of this efficient vibratory motion for greatest production.
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3. Since only the screen jacket does the work, it alone is vibrated and the power requirement is extremely low—about ½ H.P. under full load operation.
4. Maintenance is very economical due to simple, rugged construction—field facts show that yearly upkeep is less than 1% of the original investment.
Complete details of these and many other money-saving features are explained in Bulletin 14-H. Send for it today.
THE DEISTER
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★ The ORIGINAL Deister Company ★ Inc. 1906

Drilling is a major factor in better utilization of manpower and powerful strip mining machinery, particularly because the opportunities for digging overburden without shooting are becoming fewer as stripping goes deeper.

The effectiveness of drilling equipment depends upon the cutting edge of the bit. When the cutting edge is Kennametal —as demonstrated by scores of thorough, comparative field tests—more coal can be removed in less time at less cost.

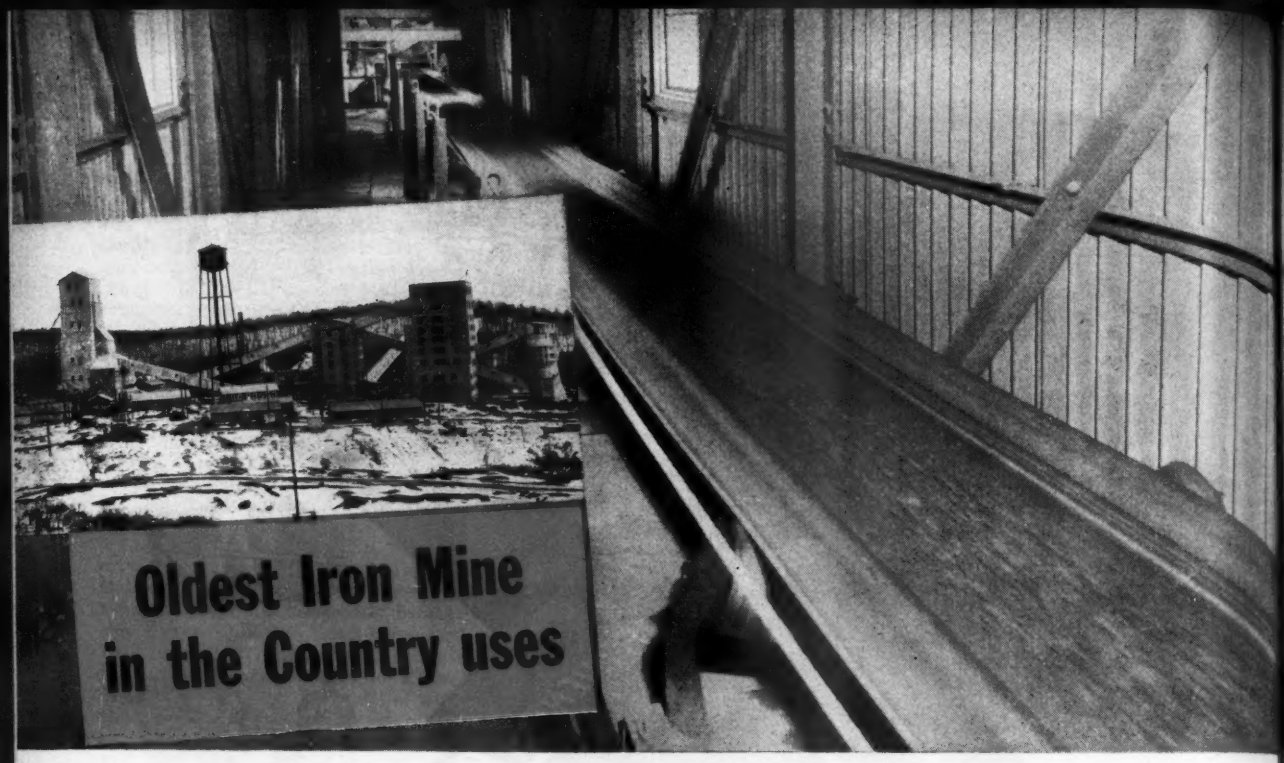
Kennametal Drill Bits have brazed-in cutting tips of durable Kennametal—the cemented carbide that is exceptionally tough and hard (75 to 76 Rockwell C compared to 66 to 67 for the hardest tool steels). They can be fed faster with less power consumption, will drill far more footage before resharpening is required, and can be reground many times. Their design assures continuous maintenance of hole gage, without over- or under-drilling.

Four sizes of these revolutionary new bits are now available for stripping operations, as listed in the table below. The bodies are heat-treated alloy steel castings, with bar-steel shanks, welded-in, of a shape and length to fit the sockets of the most common types of augers. A properly-shaped extension of the shank projects between the prongs to form an effective core breaker. Hexagonal shanks, as illustrated, are considered our standard. Alternate forms (square and splined) can be supplied on most sizes.

KENNAMETAL DRILL BITS★

Drill Diameter	Catalog Number	Purpose of Drilled Hole
3½"	D7	3" Powder Stick
4"	D8	3½" Powder Stick
5"	D9	4" or 4½" Powder Stick
6½"	D10	4½" or 5" Powder Stick

★Sizes listed have three prongs, and are intended primarily for stripping operations. Smaller sizes, designed for underground mining, have two prongs and are available in following diameters: 1¾", 1⅝", 1¼", 2¼", 2½" and 3".



MANHATTAN CONVEYOR BELTS

For more than 200 years, the Mt. Hope Mine at Wharton, N. J., oldest in the country and a supplier of ore for George Washington's armies, with perhaps the deepest perpendicular iron mine shaft in the world, has been producing high-grade magnetite ore.

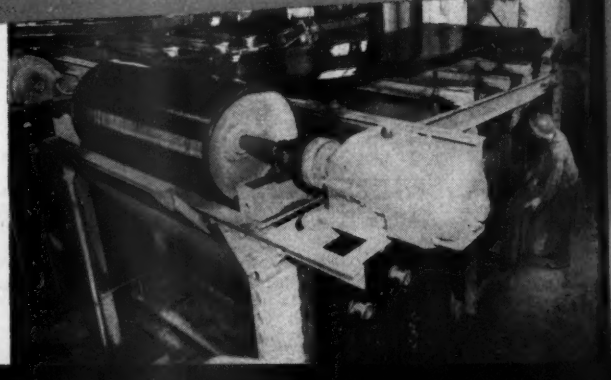
Today the mine has been mechanized, a new and modern preparation plant has been erected with over 4,000 feet of MANHATTAN Conveyor Belt installed throughout to help in an annual production now estimated at 400,000 tons.

Every belt was engineered by MANHATTAN with correct weight of duck, number of plies and thickness of cover used to give the longest life and to deliver the greatest tonnage. In addition, every belt was made endless on the job by experienced MANHATTAN belt men.

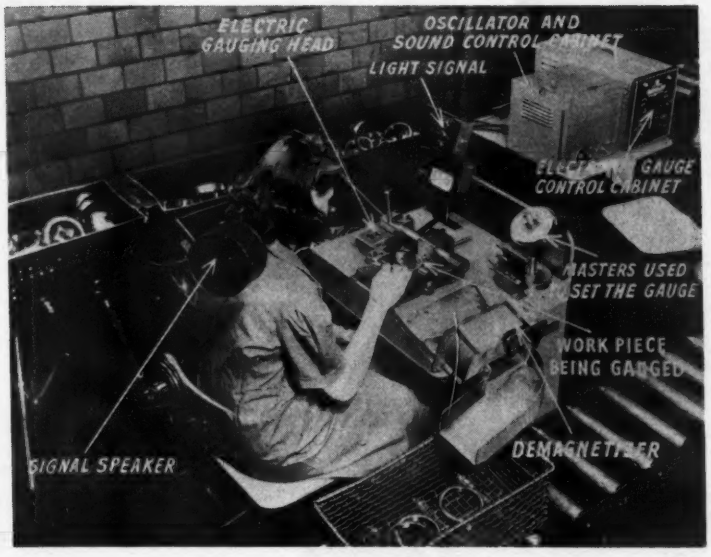
Below—Skip Hoist with RAYBESTOS-MANHATTAN Brake Blocks as original equipment.

Right—MANHATTAN BELTS on Davenport-type wet magnetic separators.

THE MANHATTAN RUBBER MFG. DIVISION
OF RAYBESTOS-MANHATTAN, INC.
Executive Offices and Factories PASSAIC, NEW JERSEY



New Hope for the Blind in Industry



A NEW electronic sound gaging device, which may mean employment to thousands of America's otherwise unemployable blind, was given its first public demonstration recently in the Canton factory of The Timken Roller Bearing Company.

High-ranking leaders of the blind, industry, the American Legion, and company officers were present as a sightless operator quickly fed the outer races of bearings into an outside diameter gage equipped with the new device—at a rate rapid enough to bear comparison with that of a sighted operator.

Helen Keller with Polly Thomson, her constant companion for more than 30 years, was on hand to reflect what the new gage may come to mean to thousands whose blindness keeps them from earning a living. There are approximately 270,000 blind Americans. At present more than 50 partially or totally blind people are employed in various operations at company plants.

At a specially-built assembly line two operators, one blind and one sighted, demonstrated how both the standard gage and the gage for blind operators are used.

The standard indicators show highly enlarged (or amplified) readings of any variations in the diameter of the work-piece being checked (in this case a bearing part). Parts with diameters over or under the specified size limit—or out of round—are readily detected and removed.

To enable a blind operator to do this work with equal accuracy, a sound indicator is used on the same type of gage. A small, cone-type speaker mounted on the back of the operator's chair is connected with the electronic device. The operator hears three different notes. An article that is normal or within the size limit is indicated by the sound of the middle note. The high note indicates the article is over-size, while the low note indicates that it is undersize. At the sound of either of these notes, the operator rejects the article under inspection.

The three notes are produced by an electronic oscillator controlled by relays connected to the three indicator lights of the electronic gaging system. The red, green and orange indicator lights correspond to the three notes of the sound device, the red being high, the green low and the orange middle. The indicator lights give the lineman (who sets up each gage) a quick visual check on the gage's efficiency. The gage is originally set and is adjusted to a master gage and can be made to give both a visual and sound indication as close as one five-millionth of an inch over or under a specified diameter tolerance. Timken engineers spent almost two years in experimenting with various gages before a satisfactory one was found.

Wanted

Superintendent or mining engineer for large strip mine in North Dakota. Good chance for personal advancement. Write fully and state salary desired.

DAKOTA COLLIERIES COMPANY
1506 Foshay Tower
Minneapolis, Minnesota

Pioneer "A" Headframe Removed

The cantilever-supported headframe which served the Pioneer "A" shaft of the Oliver Iron Mining Company at Ely, Minn., has now been dismantled. Its construction was necessitated by the occurrence of ground slip due to adjacent mining operations. With its support on solid ground, however, it was possible to maintain operations of the vertical shaft for 30 years. A settlement of two feet at the shaft was taken care of by jacking up the front columns and blocking.

Recently, the E. J. Longyear Company made a new connection with this shaft by sinking an inclined offset. The inclined portion is 70 degrees from the horizontal and 648 ft. long. Connection is by means of a curved section 140 ft. long of 400 ft. radius. The new collar is 246 ft. back from and 30 ft. above the old one.

SAUERMAN
LONG RANGE MACHINES

High pile of screenings is reclaimed to washery at rate of 300 tons per day by small Sauerman Scraper.

ON work where materials are to be moved distances of several hundred feet or more from pits, ponds, banks or stockpiles, a SAUERMAN Drag Scraper or Cableway is a great money-saver because it will dig, haul and place the materials in one operation.

Sizes range from small portable units designed for cheap handling of a small hourly tonnage of loose materials up to powerful machines that will take 15 cu. yds. at a bite and move this big load a distance of 300 ft. in about one minute.

Write for Catalog

SAUERMAN BROS., Inc.
540 S. Clinton St. CHICAGO 7

SQUEEZEROO

Any resemblance between the agonies of this hefty belle and the punishment that U. S. Royal Cords and Cables must take in the laboratory before being certified "safety-tested" is purely intentional.

The "squeezeroo"—as gruelling a compression test as we can devise—is only one of the assurances you have that U. S. Royal means maximum dependability. Rigorous trials by heating, freezing, stretching, and bending must also be successfully weathered by U. S. Royal Cords and Cables—so you can be sure they'll do the job you have in mind—whatever the conditions.

THE NEW U. S. ROYAL *Safety Tested*

MINING MACHINE AND LOCOMOTIVE CABLES

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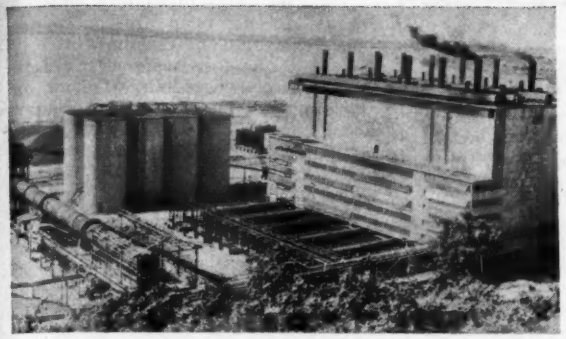
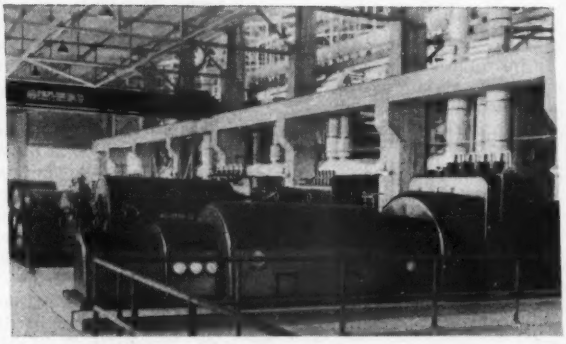
SERVING THROUGH SCIENCE WITH ELECTRICAL CORDS AND CABLES

NICARO NICKEL PLANT IN CUBA



The 16-hearth, oil-fired Herreshoff furnaces in the building at the right are the largest of their kind in the world



The turbine floor of the power plant. There are six 1,500 kilowatt turbo alternators

A $33,500,000 nickel ore center built in record time in a remote sector of northeastern Cuba is supplying a portion of the nickel for United States war requirements.

Nicaro Nickel, two years ago, was still a blue-print in the drafting rooms of the Freeport Sulphur Company. Company engineers, however, had developed a method to make the low-grade Cuban ore yield better than appreciable amounts of urgently needed nickel, acording to the Office of Inter-American Affairs. This year Nicaro is producing 27,500,000 pounds of nickel for the United States.

Mining men have known for many years that the hills back of the Nicaro community could produce nickel ore. But the ore was low-grade and mining was not considered practical. However, as the United States nickel problem became acute, Freeport company engineers perfected their process and developed ways of obtaining the valuable metal in paying quantities from ore assessed at as little as 1.5 percent Ni.

Most of the construction material was shipped through Florida ports with or without convoy and the plant grew rapidly with 8,000 workers laying out railroads from plant to ore fields, setting up the plant and building a community for workers.

Now the Nicaro plant is the largest industrial unit in Cuba. The ore-reducing building, 10 stories in height, has some of the world's largest furnaces and its four giant rotary kilns for drying the ore are rated the biggest in the world.

Out of this wartime development of a huge new industry has come the second largest power plant in Cuba, exceeded only in size and output by the power plant servicing Havana, the nation's capital and largest city.

This new addition to Cuba's industrial growth generates both electric and steam power for the mining and nickel recovery plant of the Nicaro Nickel Company on Levisa Bay in Oriente Province in northeastern Cuba as well as electric power for the plant site town of Nicaro.

A new application of a controlled reduction and leaching process for recovering nickel from low grade ore is used by Nicaro to obtain nickel for the government's Metals Reserve Company. The mining and recovery plant was built for the Defense Plant Corporation.

The power plant for this project uses six Babcock and Wilcox Stirling type boilers with a rated capacity of 345,000 pounds of steam per hour and with a pressure of 250 pounds to the square inch at a total temperature of 500 degrees Fahrenheit.

It has six Worthington-Moore 1,500 kilowatt turbo alternators, generating current at 2,300 volts and 60 cycles.

Two of the turbines are of the non-condensing type and four are of the extraction type. There also is a 4,000 kilowatt General Electric turbo alternate putting out current at 2,300 volts and 60 cycles. The turbine of this unit is of the extraction type. The total output at present is about 160,000 kilowatt hours per day.

The power plant also has a Graver hot process, lime soda system to treat the boiler feed water. The system is divided into two units, each of which has a rated capacity of 30,000 gallons per hour.

At present the plant is generating 5,200,000 pounds of high pressure steam per day, 4,000,000 pounds of which are converted to low pressure steam for certain uses in the plant.

Construction of the power plant and the obtaining of equipment and personnel presented the same formidable obstacles that surrounded development of the entire project at a time of war.

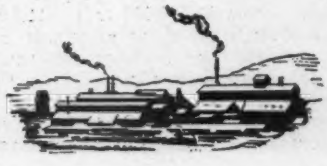
Submarines menaced shipping, there was a shortage of all equipment and materials and a lack of trained workers. Building materials were so scarce it was necessary to buy up abandoned steel structures at various points throughout the United States and ship them to Cuba. Special equipment was rushed to Nicaro by air.

One break came when the WPB reallocated to the Nicaro project three giant generators, originally built for the Willow Run bomber plant. A fourth one was found in a woolen mill in Massachusetts, was reconditioned by engineers and rushed to Cuba.

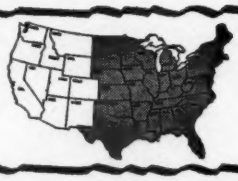
Operation of the power plant was started with Cuban labor working under key supervision from this country. The Cuban labor had to be carefully trained, with the job developing into a weeding out process until those capable of displaying sufficient technical ability were found.

But despite all of these obstacles in the creating of a new power plant for a new and complicated metallurgical process, the company's engineers say they now have in efficient operation the second largest power plant in Cuba.

Where only a jungle existed three years ago, there is today a plant supplying power that makes possible a second source of critically-needed nickel for this country's continued armament program as well as nickel for postwar products.



Western States



Power Line Project Approved

Announcement was made July 25 by Marvin A. Fuller, manager of the Community Public Service Co., Silver City, N. Mex., that the War Production Board had approved a major 150-mile REA power project for the Grant and Catron County mining area. The extension of power lines will serve Mogollon, 80 miles to the northwest, providing electric power for mining operations there. Also to be served will be the Pinos Altos gold-silver district 9 miles north of Silver City. Surveys for the project are under way and construction is scheduled to start in August with completion of the project by early spring in 1946. The REA has allocated $943,705 for new projects in New Mexico.

Early resumption of gold-silver mining at Mogollon is planned. Lehigh Metals Company plans driving a deep transportation and drainage tunnel at its properties in the District, comprising 49 patented claims, including the Fanney, Maud S and Cooney mines, former producers. Lehigh Metals Company is a Pennsylvania corporation. Eugene Schimpff is president and John A. Hart secretary-treasurer. Offices are in Scranton, Pa. Resident manager is William J. Weatherby, Mogollon.

Decreased State Mineral Valuations

Arizona's State tax commission has placed a valuation of $147,463,757 for 1945 taxation on producing mines of the State. The figure is a reduction of $4,286,150 over the previous year.

The heaviest valuation cut, from $7,116,927 to $4,486,009, is for the Magma Copper Company at Superior.

Notable increases were for the Phelps Dodge Corporation's Morenci mine, from $49,490,794 to $50,435,036; and the Castle Dome property at Miami, from $1,000,000 to $1,511,544.

The tax commission statement reported that five holdings, operating in 1944, have been removed from the 1945 tax rolls. They are the Tombstone Development Company, Ord Mercury Company, Reymert Company, Calahan Zinc Company, and the Phelps Dodge Equator property.

The following were listed as relying on Federal subsidies for continued war production: Magma at Superior; Inspiration in the Globe-Miami district; Bagdad Copper Company and Iron King in Yavapai county; Castle Dome at Miami-Globe; Trench mine in Santa Cruz county; Mammoth-St. Anthony, Eagle-Picher, and asbestos properties near Globe.

Future Aluminum Source

A future potential source of aluminum, assaying 17 percent in the lightweight metal, is gathering in concentrator tailings of the Phelps Dodge Corporation's Morenci, Ariz., copper mines, according to recent company announcement.

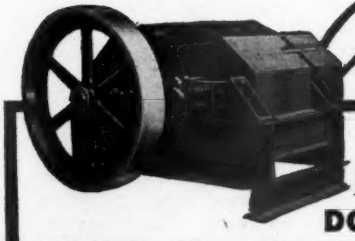
The great heap of tailings building up at Morenci from present copper operations could be reclaimed at any time, but it may be some years before it will become necessary to draw on the supply. The dump will return about one-half the percentage of metal now being taken from Oregon and Washington aluminum-bearing clays, officials of the mining company said.

The company has worked out a successful method of recovering the Morenci aluminum on a laboratory scale that is dependable upon large-scale operation.

Cordero Has High Grade Quicksilver

Notwithstanding the labor shortage being in its worst condition since this country went to war, the Cordero mine, near McDermitt, on the Nevada-Oregon border, is reported to be recording its highest production of quicksilver to date. The production is 25 flasks a day, with July production expected to exceed that. A higher grade ore has recently been encountered, but the de-

WHEN THE PROBLEM IS *Crushing*



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clining prices being paid and prospects for an even further decline now forecast additional decrease in profits.

Production at Goldfield

Andy Anderson, veteran Goldfield miner, recently shipped a 40-ton car of ore which he had taken from a lease on the old Clermont mine to a Utah smelter. It was said to be of high grade. The Clermont was one of the most productive of the Goldfield Con. properties in the boom days of Goldfield. Leases on the first three levels of the Combination shaft at Goldfield have been taken by Prospectors Friend, Inc., a leasing company. The Combination was one of the heavy producers in early Goldfield days and was noted for its high grade production, when $100 ore was piled up only as milling ore.

Gold Strike Interest Wanes

Interest in a reported strike of gold ore in the vicinity of the famous old silver camp of Austin, has just about vanished, due to the fact that the strike was not considered very important. The strike report came from Charles W. Meyer and his son, Louis, old time mining men, who reported rich gold ore on property they had been working on the east side of the Toiyabe range in Smoky valley. The Meyers exhibited some free gold ore, but those familiar with gold mining in the area adjacent to Austin, did not become excited, as ore of this character has always proved to be pocketey, with the pockets small. The Meyers have not given up, however, and are said to be doing well with a small mill on the property.

Silver Cable Declares Dividend

The Silver Cable Mining Company has declared a dividend of 2 cents a share, totaling $25,000, and payable after August 12 to stock of record on that date. This is the second dividend declared by the company, the first one being in July, 1944 for 1 cent per share, or $12,500, making the total dividends to date at $37,500. The money for these dividends is obtained from royalty payments on ore mined by the Hecla Mining company, operating the mine under a lease agreement. At the time of taking the lease, Hecla engineers estimated the ore in sight at about 20,000 tons averaging 5 percent lead and 15 percent zinc. Subsequent development has greatly increased that tonnage and the leasers produce on an average of about 80 tons per day. The ore is trucked from the mine on the main divide of the Bitterroot mountains east of Mullan, Idaho, to the Hecla mill at Gem, a distance of 17 miles. From July to December, 1943, Hecla's proportion of the operation netted the company $46,054.44, and from April to November, 1944, assessable net profits from the lease netted Hecla $79,818.22. The mine is not operated during the winter months on account of snow conditions.

Purchase Vindicator Claims

W. J. Logus & Company of Seattle have purchased the Vindicator group of mining claims east of and adjoining the rich Lucky Friday mine at Mullan from Catherine Powers and family for a reported consideration of $22,500. The new owners have started work with a bulldozer and mucking machine cleaning up caved surface conditions surrounding the lower prospect workings. Several shipments of high grade silver-lead ore were made several years ago by leasers from this property. Logus & Company are planning on opening the Vindicator vein by driving east on the fissure from the 1,000-foot level in the Lucky Friday shaft.

Deepen Main Shaft

The Coeur d'Alene Mines corporation is now engaged in sinking its main shaft from the 2,200 to the 2,600-ft. level to open two known veins at greater depth. The company's main vein, from which all former production has been made, lost its silver values at about the 200-ft. level and it is hoped a zone of enrichment will be encountered on the deeper level in this ore body. In the meantime the company has prospected another vein on the 2,200 level which has shown scattered shoots of high grade silver ore for a distance of 500 ft. and it is believed additional depth will show improvement on this vein, which is only a short distance from the shaft.

American Smelting Buys Mike Horse Mining

American Smelting & Refining Company is reported to have purchased for cash from Robert P. Porter, Spokane, and associates, all the stock of the Mike Horse Mining & Milling Company, at present the largest producer of lead and zinc in Montana. The price is said to have been approximately $850,000.

The Mike Horse company owns more than 30 mining claims and has modern mining, milling and surface equipment. These are located about 55 miles northwest of Helena and 125 men are employed. Operations are to be enlarged under the management of H. G. Washburn, manager of the Federal Mining & Smelting Company. The purchase adds to the ore supply for American Smelting's East Helena smelter.

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Labor's War Contribution Praised

Tribute to the unlimited ability of the American laborer, business man, producer and manufacturer was paid by W. Harold Hoover, vice president and general counsel of the Anaconda Copper Mining Co., at Great Falls, Mont., recently. Hoover declared that the world, whether it likes us or not, respects the productivity of this country following the brilliant example of production given by the United States since the start of the war.

"The record is more amazing in view of the fact that the work has been done with fewer men and older men, who have turned out metals and fabricated materials.

"Less men have produced more copper, lead, zinc and other metals, plus manganese and chrome," he declared. "Production of these materials has been out of mines operated for years, with the exception of the chrome company, with capital already invested for years and with the same staff.

"The lesson in this is that when we have been called upon to produce essential nonferrous metals of the war, the Government didn't have to put in any money or lend any men."

Hoover recalled that this country was built by people who have been doing things and developing materials for regular trade and markets not connected with war. The ability of the properties themselves and the men who run them to meet the greatest emergency of all time is phenomenal, he said.

He went on to outline the numerous problems confronting his company during the war, most of them of a metallurgical nature, involving the improvement of such ores as the low-grade manganese and chrome found in the United States since the Government was not able for some time to import a better grade.

He told also of the development of the chrome deposits in the Stillwater district, known for 40 years but not developed until the wartime exigency.

"There has never been a time, except for local instances due to transportation, when we have not had more munitions and implements of war than required back of the fighting fronts.

"Probably the biggest mistake Hitler made was to underestimate the American capacity to produce things for war. There is no doubt the Japanese have made the same blunder to a much more marked degree."

Grey Eagle Copper Mines Closed Down

The Grey Eagle Copper Co., Siskiyou County, California, which has operated the Grey Eagle mine at Happy Camp since 1942, has ceased all mining operations and a crew of men is dismantling all equipment and removing machinery. This venture is owned 99.9 percent by the Newmont Mining Corporation and is operated under a contract with the Metals Reserve Company. Robert J. Hendricks has been general manager for the Grey Eagle Copper Company at Happy Camp. Preparation of the Grey Eagle Copper Company for production was under way in 1942, including construction of a 500-ton mill which went into production in 1943.

Gold Mining Operations Resumed

The Harvard Gold Mining Company plans resumption of operations as soon as manpower and materials are available. Its property, formerly one of the leading producers on the Mother Lode, is near Jamestown, Calif.

The Transierra Gold Mining Company is installing equipment at its North Star property near Tuolumne, Calif. The mine workings include a 360-ft. shaft and several hundred feet of drifts on the footwall ledge.

Immediate operation of the Gold Ribbon mine near Coarsegold, Madera County, is being planned by John A. Hassell and associates. The main ledge is reported to have a 4-ft. width of milling grade ore. The property has an amalgamation-gravity-concentration plant.

Pacific Mining Company is said to be preparing its Pine Tree, Josephine and Jenny Lind properties for resumption of operations as soon as manpower and materials are available. This company has been engaged in copper mining activities during the gold mine shutdown.

John K. Jones plans immediate operations at his Gold King mine in Calaveras County near Westpoint. The Gold King is an old producer, being credited with an output of some $25,000 in gold values.

It is stated that the Empire Star Mines Company, Ltd., at Grass Valley, will not be able to return its properties to capacity production for some time, as considerable repair work is needed to rehabilitate the operations.

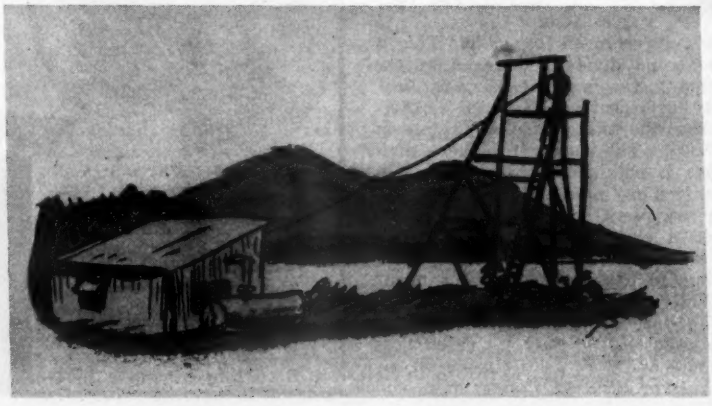
The Yuba Consolidated Gold Fields, Ltd., states that it is ready to resume operations on a regular scale as soon as a sufficiently large crew can be obtained to man its 10 dredges.

The Natomas Company, now operating two of seven dredges, hopes to increase its gold mining operations as additional crews are available.

Idaho Maryland Mines Corporation, although granted permission by the War Production Board on March 10, 1945, to hire 200 employes and to produce up to 7,800 tons of ore, has been able so far to obtain only 130 men and is operating at limited capacity. Idaho Maryland controls properties in the Grass Valley, Calif., field, and at one time was the largest producer of gold from quartz in California and the second largest in the country, being exceeded only by the Homestake Mine in Lead, S. Dak.

It is planned to reopen and further develop the old Uncle Sam mine in Shasta County, Calif., a property of the recently reorganized High Divide Mining Company. This copper-gold property was a substantial producer in early days and it is hoped that further exploration of veins exposed in the tunnel will develop an ore reserve that will warrant construction of a mill.

The Golden Queen Mining Company, Mojave, Calif., according to announcements, was awaiting end of the war with Japan before resuming mining operations, because of the high cost of materials and the lack of manpower. Except for diamond drilling work, operations at the Golden Queen are at a standstill.



New Fluorspar Concentrator

H. W. Halton, of Wallace, Idaho, who is northwest representative for the H. & H. Sink & Float Corporation, has just completed installation of a sink-and-float plant at a fluorspar property near Keller, Wash. Mr. Halton installed the first sink-and-float plant in the Coeur d'Alene district at the Sullivan Mining Company's Star mill at Burke and later installed a complete plant at the Bunker Hill mine at Kellogg.

Union Silver Prepares For Production

Production in the near future is expected by the Union Silver Mining Company, which is now re-equipping its Indiana mine in the Grande Ronde district of Union County, near La Grande, Oreg. Heavier machinery is being installed and plans have been made to continue exploratory work in this lead-zinc-silver producer. Drifting and sinking operations were started at the Indiana this spring and when production is under way, ore will be shipped from Hilgard, 32 miles from the mine over a good road. Raleigh Chadwell, of La Grande, is in charge of operations.

Chrome King Operation

The Chrome King property near Grants Pass, Oreg., has now been opened by a shaft and tunnel to a maximum depth of 100 feet. Considerable development work is under way and is being conducted by Thompson and Cox, of Grants Pass. Production operations have now reached the stage where the daily output averages about five tons of chrome ore, according to Edward Cox, one of the partners.

U. S. Smelting Cannot Mine Alaskan Gold This Year

REVOCATION of the Government ban on gold mining is too late for resumption of gold dredging operations by U. S. Smelting, Refining & Mining Company in Alaska this year. The season is too far along for preparation of the ground and necessary labor is not available.

The Federal Government is still carrying out various construction activities in Alaska using native and imported labor and is paying much higher wages than the mining companies would consider economical.

In normal times a considerable number of workers are transported to Alaska each year to operate U. S. Smelting dredges but due to West Coast labor scarcity, it is not likely they would be available this year. The company is operating only one dredge at Fairbanks redigging tailings, a negligible operation as far as earnings are concerned. It is operating no dredges at Nome.

BOOK REVIEW

VOL. 16, NO. 1, TECHNICAL Series Bulletin, Mining Experiment Station, Missouri School of Mines and Metallurgy, Rolla, Mo.

"A COMPARATIVE Analysis of Some Recent Mining Practices in the Tri-State Mining District," by J. D. Forrester and James F. A. Taylor, describes the time-study data of the new "jumbo" drilling equipment. These data are comparatively analyzed with statistics of post and tripod drilling operations. The research indicates why and how drilling and attendant ore production are obtained more efficiently by use of the short sash and long sash "jumbo" equipment. The hauling and hoisting methods most economically adaptable to conjunctive use with the new drilling apparatus are also determined.

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MANUFACTURERS FORUM

"Sul-Set" Diamond Core Bits

A new line of diamond bits for drilling cores in many different materials is announced by the Sullivan Machinery Company, Michigan City, Ind. Manufactured under the trade name "Sul-Set," these core bits are designed for use with the Sullivan line of rotary blast hole drills for the metal mines, motorized drill rigs for exploration oil-field drilling and with Sullivan core drills for use in drilling dam and bridge foundations, grout holes, ore bodies, coal seams and many other purposes.

"Sul-Set" bits are said to have an exclusive patented design whereby the cutting face consists of a special alloy matrix molded with a series of ridges into which small diamonds are sintered. The valleys between the ridges serve as water ways designed to reduce resistance to the flow of water through the bit and around the cutting surfaces. This is said to create fast and efficient removal of drill cuttings, permitting the diamonds to be in constant contact with the uncut material, resulting in more hole in less time. It is also pointed out that the reduced resistance to flow of water circulating through the bit insures adequate cooling which protects the diamonds from heat damage and lengthens the bit life.

The diamonds are said to be set in a novel pattern around the cutting surface in a manner designed to require less power from the drill and to result in less wear to the bit.

Four sizes of bits are available. In addition a Sul-Set reaming shell for reaming the hole to a larger size just behind the bit and a special "Sul-Set" bit for drilling coal formations are available. "Sul-Set" bits are carried in stock at all Sullivan branch offices. Bulletin D-33 describing the "Sul-Set" Bit is obtainable upon request to the manufacturer.

New Instant-Start Fluorescent Lamp

A new 40-watt fluorescent lamp, tailored especially for more dependable operation of instant-start lamps, will be available soon from the Westinghouse Lamp Division, Bloomfield, N. J.

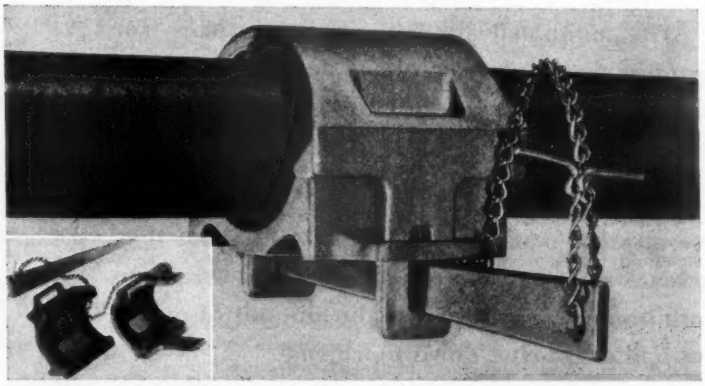
Freed from the former requirement that instant-start lamps be used with special lampholders, the lamp contains a new feature, a special metal tab within a medium bipin base. The tab, explains Eugene W. Beggs, Lamp Division commercial engineer, is riveted to the two base pins, connecting them within the lamp itself and preventing possible damage to the lamp cathodes in the event improper or defective lampholders are used.

Because of this connection "the lamps will not operate on regular starter type equipment and can be used only with instant-start ballasts.

"It is an underwriters' requirement that each of the two primary wires of an instant-start ballast be led through the lampholders at one end of the lamp so that the removal of each lamp opens the primary electric circuit. Special lampholders now used incorporate a short circuiting device designed to prevent the primary current from passing through the lamp and overheating the electrode filament. This device is also designed to open the primary circuit when the lamp is removed."

The new lamp structure, Mr. Beggs forecasts, will encourage a wider use of the instant-start systems because of its dependability and adaptability.

New Flexible Pipe Couplings



Easier coupling of pipe at lower cost and with greater flexibility is claimed by the manufacturer, Drinkwater, Inc., 2323 S. Michigan Avenue, Chicago, for the new line of flexible pipe couplings known as Drinkwater Presto-Lock Couplings. Presto-Lock Couplings are made in 11 sizes from 1¼-in. to 16-in.

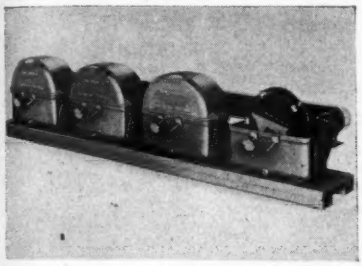
An important feature of Presto-Lock Couplings is that they can be used with any plain end pipe without threads, grooves or flanges. No wrenches or special tools of any kind are required in assembly. Only a hammer is needed to tighten wedge keys after the two sections are fitted over pipe ends and wedge keys have been inserted in the key channels. The procedure, according to the manufacturer, is so simple that even the most inexperienced workmen can assemble Presto-Lock couplings in a matter of seconds.

The three simple parts of Presto-Lock Flexible Couplings are the two corrosion-resistant malleable iron castings and the quick-locking wedge key. Sizes 1¼-in., 1½-in., 2-in., 2½-in. and 3-in. are equipped with one wedge key and chain assembly to prevent loss of coupling parts. Sizes 3-in. to 16-in. have two wedge keys but no chain assembly. The gaskets which are used on all Drinkwater Presto-Lock couplings have been specially designed to affect a permanently tight seal on all types of pipe lines. Three types of gaskets are available: synthetic rubber, neoprene and natural rubber.

New Multicompartment Feeder for Liquid Chemicals and Flotation Reagents

Most chemical and flotation processes require the distribution of several chemicals or flotation reagents, each in different quantities, to many points in the circuit. Centralizing the point of distribution is frequently desirable and is more easily accomplished with the use of multicompartment feeders.

To meet the requirements for such a unit the Denver Equipment Company has developed a new multicompartment feeder. It is reported to be a compact unit with simple but very accurate means of adjustment which provides accuracy of feed control consistent with the refinements in modern chemical and flotation processes. Each compartment is identical, in construction and operation, to the single compartment unit developed by Denver Equipment Company. The several compartments are driven by a single motor through a sprocket and chain drive.

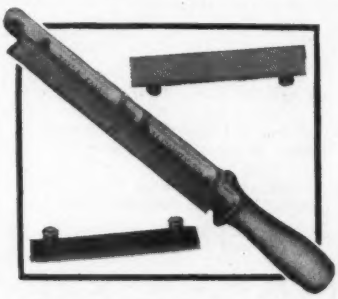


Each of the compartments may be regulated independently. Feeder cups are bolted to a plate steel disc. The size and number of cups used may be changed to vary the maximum feeder capacity. A convenient handwheel provides quick, "micrometer" adjustment of feed rate.

The multicompartment feeder provides flexibility in the distribution system. The same liquid may be fed from each compartment to different points in the circuit, or different liquids may be distributed to the same or different points in the circuit.

New Lathe File

Kennametal Inc., Latrobe, Pa., announces the development of a new lathe file said to cut steels no ordinary file will touch, at speeds three to ten times faster than possible with steel files, with a life of 50 to 200 times as long, and in addition provides longer filing surface, quick, easy



blade replacement, and greater handling convenience.

In this new design, the Kennametal blanks have brazed-on nuts, as shown in the insets on the illustration, and are attached to the light-weight aluminum alloy handle by screws. They can therefore be readily replaced when worn from long service. Two types of blanks—fine (30 teeth per inch) and coarse (20 teeth per inch) are available, and are interchangeable on the same handle. The handle grip is shaped to fit the hand, and has a thumb rest and knuckle guard. An extension beyond the filing surface supplies a convenient finger hold. A hole in this extension permits the file to be hung up.

—*Announcements*—

Sale of the Denver dealer franchise for Cummins Diesel Engines, effective April 1, 1945, to Jay B. Chamers, Cummins Regional Manager in the Mid-Continent Area since 1935, has been announced by the **Cummins Engine Company, Inc.,** Columbus, Ind.

* * *

Robins Conveyors Inc., Passaic, N. J., manufacturers of materials handling machinery, has reorganized its Sales Department, which continues under the direction of Harold Von Thaden, First Vice President. E. C. Salzman, Vice President, assumes responsibility for all export operations, including dealing with foreign affiliates and agents. J. F. Meissner, Vice President, takes over control of all Engineering Sales and of the Field Engineers.

The Equipment Sales section is now under A. E. Conover. Sales Research and Training has been put under T. W. Matchett, Secretary of Robins Conveyors Inc.; Advertising and Sales Promotion remain under E. M. Perrin; the Engineering Department continues to be headed by R. W. Eichenberger, Vice President.

* * *

Employes of the Aurora, Ill., plant of **Independent Pneumatic Tool Company,** manufacturer of Thor Portable Pneumatic and Electric Tools, have been awarded their fifth Army-Navy "E" production banner.

The Electric Storage Battery Company, manufacturer of Exide batteries, was awarded recently a fifth "E" star.

* * *

Templeton, Kenly & Co., has been granted the Army-Navy Production Award by Robert P. Patterson, Undersecretary of War. The company's most prominent contribution to the war effort has been a special track connector for the speedy mounting, demounting and repair of tank crawler treads.

* * *

The General Offices, Repair Department, Service Department and Rental Department of the **Atlas Equipment Corporation** is scheduled to move to 635 Ridge Avenue, Pittsburgh 12, Pa., on or about August 1.

* * *

For oversubscribing their quota in the Seventh War Loan Drive, employes of **The Manhattan Rubber Mfg. Division** of Raybestos-Manhattan, Inc., received two U. S. Treasury citations and two citation seals to be placed on a heavy four-engine bomber and a medium tank, which they are sponsoring. Brake blocks, fuel oil hose and control hoses for the bomber and clutch facings for the tank are made at Manhattan.

The presentation was made to Harry E. Smith, Manhattan's General Manager, by Howard Smith, Deputy Administrator of the New Jersey Finance Commission. This is the second time Manhattanites have sponsored equipment for the Army.

CATALOGS AND BULLETINS

BEARING APPLICATION. *Adv. Dept. of New Departure, Division of General Motors Corp.*, Bristol, Conn. Booklet BA, with 78 drawings and charts and a description of bearing mounting applicable to all types, pre-loading methods, their effect on housing fits, the effect of press fits on pre-loading, the effect of pre-loading on bearing life, bearing creep, the use of duplex, shield and sealed bearings, etc.

DIRECTORY OF PRODUCTS and engineering literature describing its lines of equipment. *Allis-Chalmers Mfg. Co.*, 565, Milwaukee 1, Wis. Major portion devoted to a listing of more than 1,600 product types. New products added since the previous directory, such as induction and dielectric heating equipment, are indicated by a star for easy identification. Copies of the directory of products and engineering literature are available upon request.

ELECTRODES. *Air Reduction*, 60 East 42nd Street, New York 17, N. Y. Fifty-six-page book contains a combined electrode selector chart and index, illustrated sections on mechanical properties and testing and on approvals. Copies upon request.

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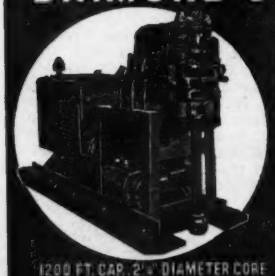

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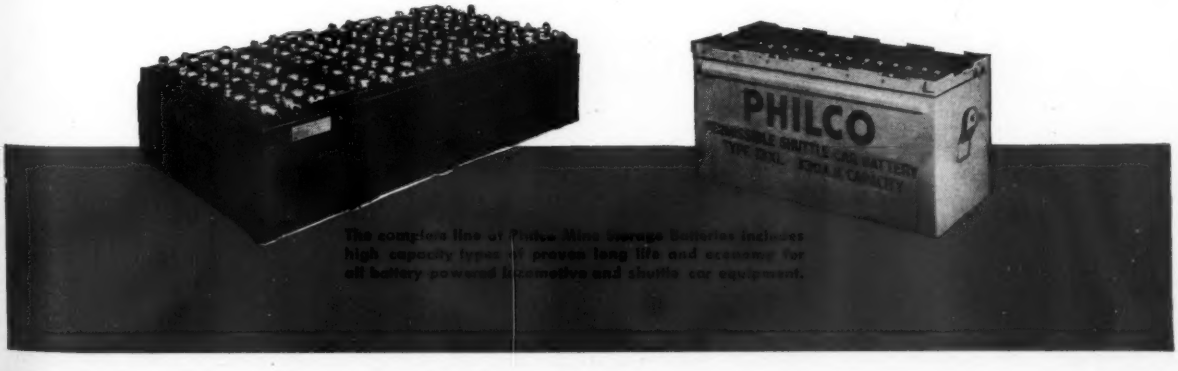

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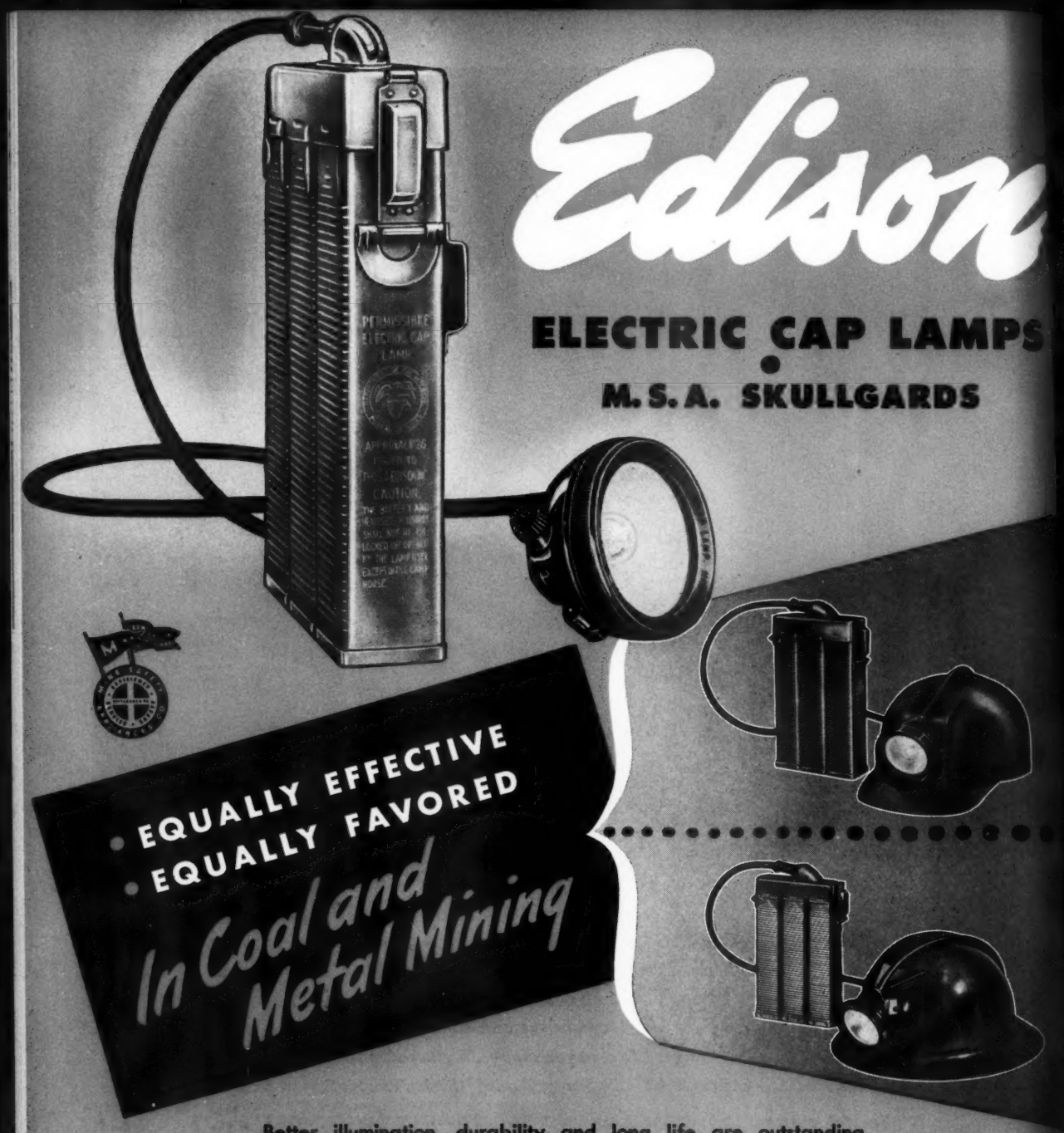

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